



**The Long Term 2 Enhanced  
Surface Water Treatment  
Rule (LT2ESWTR)  
Implementation Guidance**



### ***Disclaimer***

This document provides guidance to states, tribes, and U.S. Environmental Protection Agency (EPA) Regions exercising primary enforcement responsibility under the Safe Drinking Water Act (SDWA) and contains EPA's current policy recommendations for complying with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). Throughout this document, the terms "state" or "states" are used to refer to all types of primacy agencies including U.S. territories, Indian tribes, and EPA Regions.

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The general description provided here may not apply to a particular situation based upon the circumstances. Interested parties are free to raise questions and objections about the substance of this guidance and the appropriateness of the application of this guidance to a particular situation. EPA and other decisionmakers retain the discretion to adopt approaches on a case-by-case basis that differ from those described in this guidance where appropriate.

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## List of Acronyms and Abbreviations

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CAFO	Concentrated Animal Feeding Operation
CCR	Consumer Confidence Report
CDC	Centers for Disease Control
CFD	Computational Fluid Dynamics
CFE	Combined Filter Effluent
CFR	Code of Federal Regulations
CT	The Residual Concentration of Disinfectant (mg/L) Multiplied by the Contact Time (in minutes)
CWS	Community Water System
DBPs	Disinfection Byproducts
DCTS	Data Collection and Tracking System
EPA	U.S. Environmental Protection Agency
FBRR	Filter Backwash Recycling Rule
FEMA	Federal Emergency Management Agency
FRDS	Federal Reporting Data System
GAC	Granular Activated Carbon
GWUDI	Ground Water Under the Direct Influence of Surface Water
HAA5	Haloacetic Acids (Monochloroacetic, Dichloroacetic, Trichloroacetic, Monobromoacetic and Dibromoacetic Acids)
HQ	Headquarters
ICR	Information Collection Rule
ICRSS	Information Collection Rule Supplemental Survey
ICRSSL	Information Collection Rule Supplemental Surveys of Large Systems
ICRSSM	Information Collection Rule Supplemental Surveys of Medium Systems
IDSE	Initial Distribution System Evaluation
IESWTR	Interim Enhanced Surface Water Treatment Rule
IFE	Individual Filter Effluent
IPMC	Information Processing and Management Center
Log	Logarithm (common, base 10)
LRAA	Locational Running Annual Average
LRV	Log Removal Value
LT1ESWTR	Long Term 1 Enhanced Surface Water Treatment Rule
LT2ESWTR	Long Term 2 Enhanced Surface Water Treatment Rule
MCF	Membrane Cartridge Filter
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
M-DBP Cluster	Microbial-Disinfectants/Disinfection Byproducts Cluster
MRDL	Maximum Residual Disinfection Level

M/R	Monitoring and Reporting
NCWS	Noncommunity Water System
NIPDWR	National Interim Primary Drinking Water Regulations
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPDWR	National Primary Drinking Water Regulation
NTNCWS	Nontransient Noncommunity Water System
NTU	Nephelometric Turbidity Unit
OECA	Office of Enforcement and Compliance Assurance
OGC	Office of General Counsel
OGWDW	Office of Ground Water and Drinking Water
ORC	Office of Regional Counsel
POTW	Publicly Owned Treatment Works
PWS	Public Water System
PWSS	Public Water System Supervision
Q&A	Questions and Answers
QA	Quality Assurance
QCRV	Quality Control Release Value
RAA	Running Annual Average
SDWA	Safe Drinking Water Act
SDWIS/FED	Safe Drinking Water Information System/Federal
SNC	Significant Non-complier
Stage 1 DBPR	Stage 1 Disinfectants and Disinfection Byproducts Rule
Stage 2 DBPR	Stage 2 Disinfectants and Disinfection Byproducts Rule
Subpart H	PWS using surface water or ground water under the direct influence of surface water
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TMDL	Total Maximum Daily Loads
TOC	Total Organic Carbon
TT	Treatment Technique
TTHM	Total Trihalomethanes (Chloroform, Bromodichloromethane, Dibromochloromethane, and Bromoform)
UCMR	Unregulated Contaminant Monitoring Rule
UV	Ultraviolet Light

# Introduction

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This document provides guidance to EPA Regions and states exercising primary enforcement responsibility under the Safe Drinking Water Act (SDWA) regarding implementation of the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) under the SDWA. It also provides guidance to the public and the regulated community regarding the U.S. Environmental Protection Agency's (EPA's) interpretation of the statute and regulations. This guidance is designed to implement national policy on these issues.

The SDWA provisions and EPA regulations described in this document contain legally binding requirements. This document does not substitute for those requirements, nor is it a regulation itself. It does not impose legally-binding requirements on EPA, states, or the regulated community and may not apply to a particular situation based upon the circumstances. EPA and state decision makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance, where appropriate. Any decisions regarding a particular facility will be made based on the applicable statutes and regulations. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation. EPA will then consider whether or not the recommendations or interpretations in the guidance are appropriate in that situation based on the law and regulations. EPA may change this guidance in the future.

This manual contains the following sections:

- \$ **Section 1** summarizes the rule requirements of the LT2ESWTR and presents a timetable of important dates.
- \$ **Section 2** lists the “stand-alone” guidance materials that will help states and public water systems (PWSs) adopt each new requirement.
- \$ **Section 3** discusses state implementation activities.
- \$ **Section 4** covers state primacy revision requirements, including a detailed time frame for application review and approval. This section also contains guidance and references to help states adopt each new special primacy requirement included in these rules.
- \$ **Section 5** addresses violation determinations and associated reporting requirements to assist states in their compliance activities.
- \$ **Section 6** provides examples of violations requiring public notification and sample language to include in Consumer Confidence Reports (CCRs).

The appendices of this document also provide information that will be useful to states and EPA Regions throughout the primacy revision application process.

- \$ **Appendix A** contains the primacy revision application crosswalk for the Rule.
- \$ **Appendix B** contains the rule language of the LT2ESWTR.
- \$ **Appendix C** contains fact sheets and quick reference guides for the Rule.
- \$ **Appendix D** presents flowcharts to help states and systems implement the Rule.

- \$ **Appendix E** contains various templates for letters that states can tailor to meet their needs.
- \$ **Appendix F** contains information about the Data Collection and Tracking System.
- \$ **Appendix G** contains checklists for reviewing documentation submitted by systems.
- \$ **Appendix H** contains guidance for reviewing extension requests under Section 1412(b)(10) of the Safe Drinking Water Act.

Please note that, in several sections, the guidance makes suggestions and offers alternatives that go beyond the minimum requirements indicated. EPA does this to provide information and/or suggestions that may be helpful to implementation efforts. Such suggestions are prefaced by “may” or “should” and are to be considered advisory. They are not required elements of the LT2ESWTR.

EPA expects to undertake necessary rule implementation activities during the period of early implementation. During this period, a state may elect to undertake some or all of the implementation activities in cooperation with EPA. This will facilitate continuity of implementation and ensure that system-specific advice and decisions are made with the best available information and are consistent with existing state program requirements.



## **Section 1**

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# **Rule Requirements**

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## 1.1 Introduction

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EPA finalized the LT2ESWTR in the *Federal Register* on January 5, 2006 (71 *FR* 653; see [www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2)). This Rule is part of a series of rules, the “Microbial-Disinfectants/Disinfection Byproducts Cluster” (M-DBP Cluster), which is intended to improve control of microbial pathogens while minimizing public health risks of disinfectants and disinfection byproducts (DBPs). The LT2ESWTR builds upon the requirements established by the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), and the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). Key provisions of the LT2ESWTR include:

- \$ Source water monitoring for *Cryptosporidium*, with reduced monitoring requirements for small systems.
- \$ Additional *Cryptosporidium* treatment technique (TT) provisions for certain filtered systems based on source water *Cryptosporidium* concentrations.
- \$ Inactivation of *Cryptosporidium* for all unfiltered systems.
- \$ Disinfection profiling and benchmarking to ensure continued levels of microbial protection while PWSs take the necessary steps to comply with new DBP standards.
- \$ Covering uncovered finished water reservoirs or treating the discharge from the storage facility.

EPA believes that implementation of the LT2ESWTR will significantly reduce levels of *Cryptosporidium* in finished drinking water. This will substantially lower rates of endemic cryptosporidiosis, the illness caused by *Cryptosporidium*, which can be severe and sometimes fatal in sensitive sub-populations (e.g., infants, immune suppressed patients, and the elderly). In addition, the TT requirements of this rule are expected to increase the level of protection from exposure to other microbial pathogens (e.g., *Giardia*).

The LT2ESWTR has been finalized concurrently with the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR), which addresses reducing peak and average levels of DBPs in drinking water supplies. The Stage 2 DBPR was finalized as a separate rule on January 4, 2006.

### 1.1.1 History

The 1974 SDWA called for EPA to regulate drinking water by creating the national interim primary drinking water regulations (NIPDWR). In 1979, the first interim standard addressing DBPs was set for total trihalomethanes (TTHM), a group of four volatile organic chemicals that form when disinfectants react with natural organic matter in the water.

#### *1986 SDWA Amendments*

Although the SDWA was amended slightly in 1977, 1979, and 1980, the most significant changes to the 1974 law occurred when the SDWA was reauthorized in 1986. To safeguard public health, the 1986 Amendments required EPA to set health goals, or maximum contaminant level goals (MCLGs), and maximum contaminant levels (MCLs) for 83 named contaminants. Waterborne disease outbreaks of giardiasis demonstrated that disease-causing microbial contamination had not been sufficiently controlled under the original Act. In addition, several hundred chemical contaminants were known to occur in the environment, but few were regulated in PWSs. EPA was also required to establish additional regulations within certain timeframes, require disinfection of source water supplies, specify filtration requirements for

nearly all water systems that draw their water from surface sources, and develop additional programs to protect ground water supplies.

In 1989, EPA issued two important National Primary Drinking Water Regulations (NPDWRs): the Total Coliform Rule (TCR) and the SWTR. The TCR and SWTR provide the foundation for the M-DBP Cluster and are summarized below.

### *Total Coliform Rule*

The TCR applies to all PWSs. Coliforms are easily detected in water and are used to assess a water system's vulnerability to pathogens. In the TCR, EPA set an MCLG of zero for total coliforms. EPA also set an MCL for total coliforms and required testing of total coliform positive cultures for the presence of *E. coli* or fecal coliforms, which indicate more immediate health risks from sewage or fecal contamination. If more than 5.0 percent of the samples contain coliforms within a month, water system operators must report this violation to the state and the public. (For water systems that collect fewer than 40 routine samples per month, no more than one sample can be total coliform-positive per month.) Finally, the TCR required sanitary surveys every 5 years (or 10 years for noncommunity water systems (NCWSs) using disinfected and protected ground water) for every system that collects fewer than five routine total coliform samples per month. These are typically systems that serve 4,100 or fewer people.

### *Surface Water Treatment Rule*

PWSs using surface water or ground water under the direct influence of surface water (GWUDI) (i.e., Subpart H systems) as a supply are prone to microbial contamination of their source water. Pathogenic microorganisms that can contaminate source water can be removed or inactivated during the water treatment sedimentation, filtration, and disinfection processes. EPA issued the SWTR in response to a Congressional mandate requiring disinfection, and filtration where necessary, of systems that use surface water or GWUDI sources. The Rule sets MCLGs for *Legionella*, *Giardia lamblia*, and viruses at zero because any exposure to these contaminants presents some level of health risk. The SWTR includes a TT requirement for inactivation (or removal and inactivation) of these organisms.

Specifically, the SWTR requires that a surface water system have sufficient treatment to reduce source water concentrations of *Giardia lamblia* and viruses by at least 99.9 percent (3.0-log) and 99.99 percent (4.0-log), respectively. In addition, disinfection residuals must be maintained throughout the distribution system. For systems that filter, the adequacy of the filtration process is determined by measuring the turbidity of the treated water since poor turbidity removal often indicates that the filtration process is not working properly. The goal of the SWTR is to reduce the public health risk for infection by *Giardia lamblia*, *Legionella*, or viruses to less than one infection per year per 10,000 people.

The SWTR, however, does not account for systems with high pathogen concentrations in source water that, when treated at the levels required under the Rule, still may not meet this health goal. The SWTR also does not specifically control for the protozoan *Cryptosporidium*, as sufficient information about its removal or disinfection was not available at the time the SWTR was finalized. Since the SWTR was promulgated, much has been learned about this organism. Most notably, *Cryptosporidium* is resistant to disinfection practices commonly employed by PWSs. Therefore, physical removal or alternative disinfectants are the most effective treatment methods.

## *1996 SDWA Amendments*

In 1990, EPA's Science Advisory Board, an independent panel of experts established by Congress, cited drinking water contamination as one of the most important environmental risks and indicated that disease-causing microbial contaminants (e.g., bacteria, protozoa, and viruses) are probably the greatest remaining health-risk management challenge for drinking water suppliers. Data from the Centers for Disease Control (CDC) confirm this concern and indicate that between 1980 and 1998, 419 waterborne disease outbreaks were reported, with over 511,000 estimated cases of disease. During this period, a number of agents were implicated as causes of the outbreaks, including various protozoa, viruses, and bacteria, as well as several chemicals (Craun and Calderon 1996, Levy et al. 1998, Barwick et al. 2000). Most of the cases (but not the outbreaks) of illnesses were associated with surface water, including a single outbreak of approximately 403,000 cases of cryptosporidiosis in Milwaukee, WI (Mac Kenzie et al. 1994).

The SDWA was further amended in 1996 to improve public health protection by incorporating new data on the adverse health effects of contaminants, the occurrence of contaminants in PWSs, and the estimated reduction in health risks that would result from further regulation. The Amendments provided for use of best-available, peer-reviewed science in decision-making and for risk reduction and cost analyses in the regulatory decision process.

### *TTHMs/Stage 1 DBPR/Stage 2 DBPR*

Many water systems treat their water with a chemical disinfectant in order to inactivate pathogens that cause disease. The public health benefits of common disinfection practices are significant and well-recognized; however, disinfection poses risks of its own. While disinfectants are effective at controlling many harmful microorganisms, they react with organic and inorganic matter (DBP precursors) in the water and form DBPs, some of which pose health risks when present above certain levels. Since the discovery of chlorination byproducts in drinking water in 1974, numerous toxicological studies have been conducted that show some DBPs to be carcinogenic and/or cause reproductive or developmental effects in laboratory animals. Additionally, exposure to high levels of disinfectants over long periods of time may cause health problems, including damage to blood and kidneys. While many of these studies have been conducted with disinfectants at high doses, the weight of evidence indicates that DBPs present a potential public health problem that must be addressed to minimize risks from long-term exposure. One of the most complex questions facing water supply professionals is how to reduce risks from disinfectants and DBPs while providing adequate protection against microbial contaminants.

The TTHM Rule of 1979 set a TTHM MCL for community water systems (CWS) serving 10,000 or more people. The Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) built on the TTHM Rule by lowering existing MCLs and widening the range of affected systems to include all PWSs (except most transient systems) that add a disinfectant. The Stage 1 DBPR established new MCLs for additional DBPs (e.g., chlorite, bromate, and haloacetic acids (HAA5)) as well as established maximum residual disinfection levels (MRDLs) for the disinfectants chlorine, chloramines, and chlorine dioxide. In addition, the Stage 1 DBPR required conventional filtration systems to remove specified percentages of organic materials, measured as total organic carbon (TOC), which may react with disinfectants to form DBPs.

The Stage 2 DBPR builds upon the Stage 1 DBPR by providing more consistent protection from DBPs across the entire distribution system and by focusing on the reduction of DBP peaks. The Stage 2 DBPR changes the way sampling results are averaged to determine compliance. The determination for the Stage 2 DBPR is based on a locational running annual average (LRAA) (i.e., compliance must be met at *each* monitoring location) instead of the system-wide running annual average (RAA) used under the Stage 1 DBPR. In addition to changes in MCL compliance calculation, systems must also conduct an initial distribution system evaluation (IDSE) to identify compliance monitoring locations that represent high TTHM and HAA5 levels. Systems are also required to conduct an operational evaluation if they have DBP levels that could result in an MCL exceedance if not reduced.

### *Filter Backwash Recycling Rule*

The Filter Backwash Recycling Rule (FBRR) complements the surface water treatment rules by reducing the potential for microbial pathogens, particularly *Cryptosporidium* oocysts, to pass through the filters into the finished water of conventional and direct filtration systems that recycle backwash water. The FBRR requires affected systems to return regulated recycle streams (e.g., spent filter backwash, thickener supernatant, or liquids from dewatering processes) through all processes of a system's conventional or direct filtration system, unless the state approves an alternate location. In addition, the FBRR requires systems to notify the state in writing about recycle practices and to maintain specific records.

### *IESWTR/LT1ESWTR/LT2ESWTR*

The IESWTR builds on the SWTR by adding protection from *Cryptosporidium* by requiring filtered systems to meet new turbidity standards for combined filter effluent (CFE) and individual filter effluent (IFE). Additionally, the IESWTR requires unfiltered systems to include control of *Cryptosporidium* in their watershed control plans. These requirements of the IESWTR apply to systems that serve 10,000 people or more. The IESWTR builds on the TCR by requiring sanitary surveys for all PWSs using surface water or GWUDI regardless of size. The IESWTR also requires covers for all new finished water storage facilities and includes disinfection profiling and benchmarking provisions to ensure systems provide continued levels of microbial protection while taking the necessary steps to comply with the DBP standards.

The provisions in the LT1ESWTR address the concerns covered by the IESWTR as they apply to small systems (i.e., systems serving fewer than 10,000 people) using surface water or GWUDI. The LT2ESWTR builds upon the SWTR, IESWTR, and LT1ESWTR by supplementing existing microbial treatment requirements for systems where additional public health protection is needed.

Collectively, the SWTR, IESWTR, LT1ESWTR, and LT2ESWTR place stringent treatment requirements on systems using surface water or GWUDI as a source.

### *The Multiple Barrier Approach*

By building on the foundation of the original SDWA, subsequent amendments to the Act have improved the quality of drinking water and increased public health protection. The 1996 SDWA Amendments, for example, require EPA to develop rules to balance the risks presented by microbial pathogens and DBPs. The LT2ESWTR is one of the most recent rules in the M-DBP Rule Cluster that expands on the foundation of prior rulemaking efforts.

Since multiple threats require multiple barriers, the LT2ESWTR and Stage 2 DBPR expand on the foundation of the TCR, SWTR, TTHM Rule, Stage 1 DBPR, IESWTR, LT1ESWTR, and FBRR standards to target health risks not addressed by prior regulations. By encompassing these previously

unaddressed health risks from microbials and DBPs, the M-DBP Rule Cluster continues to maximize drinking water quality and public health protection.

### 1.1.2 Development of the LT2ESWTR

In March 1999, EPA reconvened the M-DBP Advisory Committee to develop recommendations for the LT2ESWTR and Stage 2 DBPR. This committee also participated in the development of the IESWTR, LT1ESWTR, and Stage 1 DBPR. The Committee's members represented EPA, state, and local public health and regulatory agencies, local elected officials, Native American tribes, drinking water suppliers, chemical and equipment manufacturers, and public interest groups. Technical support for the Committee's discussions was provided by a technical workgroup established by the Committee at its first meeting. The Committee's activities resulted in the collection and evaluation of substantial new information related to key elements for both rules. This included new data on pathogenicity, occurrence, and treatment of microbial contaminants, specifically *Cryptosporidium*, as well as new data on DBP health risks, exposure, and control. The Committee held ten meetings (from September 1999 to July 2000) to discuss issues pertaining to the LT2ESWTR and Stage 2 DBPR. There was also an opportunity for public comment at each meeting.

In September 2000, the Committee signed the Agreement in Principle, a full statement of the consensus recommendations of the group. The agreement was published in a December 29, 2000 *Federal Register* notice (65 *FR* 83015) and includes the list of committee members and their organizations. The Committee's recommendations were incorporated into the LT2ESWTR and the Stage 2 DBPR.

The M-DBP Committee reached agreement on the following major issues regarding the LT2ESWTR:

- \$ Additional *Cryptosporidium* treatment should be provided for certain systems based on source water monitoring results.
- \$ Filtered systems that must comply with additional *Cryptosporidium* treatment requirements may choose from a "toolbox" of treatment and control options.
- \$ A reduced monitoring burden should be provided for small systems.
- \$ Future monitoring should be conducted to confirm initial assessments of source water quality.
- \$ *Cryptosporidium* inactivation should be provided by all unfiltered systems.
- \$ Unfiltered systems should meet overall inactivation requirements using a minimum of 2 disinfectants.
- \$ Criteria and guidance for ultraviolet light (UV) disinfection and other toolbox options should be developed.
- \$ Existing uncovered finished water reservoirs should be covered or the discharge treated unless the state approves an alternative method to comply.

### 1.1.3 Benefits of the LT2ESWTR

#### 1.1.3.1 Quantifiable Benefits

The LT2ESWTR is expected to reduce drinking water related exposure to *Cryptosporidium* substantially, thereby reducing both illness and death associated with cryptosporidiosis through source water monitoring, additional TTs, and higher standards for drinking water quality. Cryptosporidiosis is an infection caused by *Cryptosporidium* and is an acute, typically self-limiting illness with symptoms that include diarrhea, abdominal cramping, nausea, vomiting, and fever (Juranek, 1995). Cryptosporidiosis patients in sensitive subpopulations, such as infants, the elderly, and AIDS patients, are at risk for severe illness, including risk of death. The LT2ESWTR is expected to reduce 230,730 to 964,360 illnesses and 52 to 207 deaths annually after full implementation (range based on the Information Collection Rule Supplemental Surveys of large systems (ICRSSL) and Information Collection Rule (ICR) data sets). Based on these values, the mean present value of benefits (annualized at a 3 percent discount rate) ranges from \$458 million to \$1.9 billion. These values do not take into account confidence limits for non-quantified benefits.

For filtered systems, benefits to the approximately 195 million people served by filtered surface water and GWUDI systems range from a mean reduction in annual cases of endemic illness ranging from 84,609 to 464,069 (based on ICRSSL, Information Collection Rule Supplemental Surveys of medium systems (ICRSSM), and ICR data sets). In addition, deaths are expected to be reduced by an average of 14 to 77 people annually. The 10 million people served by unfiltered surface water or GWUDI systems will also see a significant reduction in cryptosporidiosis as a result of the Rule. The LT2ESWTR is expected to reduce approximately 146,121 to 500,291 cases of illnesses and 38 to 130 premature deaths annually in unfiltered systems (based on the ICR data set). Only the ICR data set is used to directly calculate reduced illness because it is the only data set that includes sufficient information on unfiltered systems.

#### 1.1.3.2 Non-quantifiable health and non-health related benefits

Although significant benefits will result from the LT2ESWTR in terms of the reduction in illnesses and death associated with cryptosporidiosis, other health and non-health related benefits associated with this rule remain unquantified due to lack of data. Non-quantifiable health and non-health related benefits of the LT2ESWTR include:

- \$ Reducing outbreak risks and response costs associated with human or equipment failure.
- \$ Reducing averting behavior (e.g., boiling tap water or purchasing bottled water).
- \$ Improving aesthetic water quality (e.g., taste and odor).
- \$ Reducing exposure to other parasitic protozoans and contaminants that EPA regulates or is considering for future regulation (e.g., pathogenic bacteria, viruses, *Giardia lamblia*, *Cyclospora sp.*, members of the Microsporidia class, arsenic, DBPs, and atrazine).
- \$ Increasing source water monitoring that leads to a better understanding of source water quality and helps systems choose more effective treatment technologies.
- \$ Reducing contamination of storage facilities by covering or treating the finished water.
- \$ Installing UV or microfiltration may allow PWSs to better regulate the amount of chlorine added to water; thereby reducing the level of DBPs in water. However, systems



adding ozone treatment to comply with rule requirements will have to be aware of the potential increase in the level of certain DBPs associated with ozone.

## 1.2 Requirements of the Rule: PWSs

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The following section provides a summary of the rule requirements. The rule requirements are from the Final LT2ESWTR published in the *Federal Register* on January 5, 2006 (71 *FR* 653). For a copy of the actual rule language, see Appendix B or visit EPA's Web site at [www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2).

### 1.2.1 General Requirements

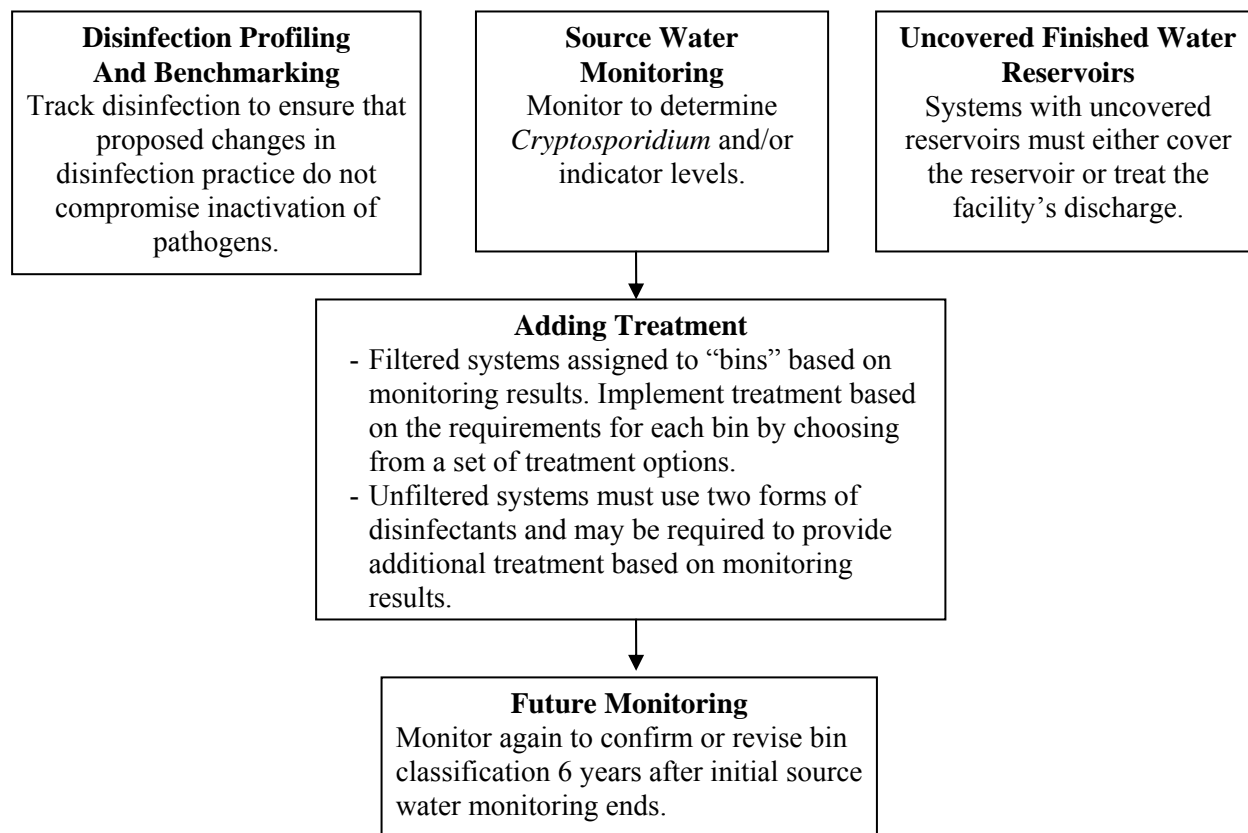
The flowchart in Figure 1-1 shows the general requirements of the LT2ESWTR. All surface water and GWUDI PWSs, including wholesale systems, must characterize their source water to determine what, if any, additional treatment is necessary to reduce *Cryptosporidium*. Systems conduct source water monitoring to determine an average *Cryptosporidium* concentration. Based on that average, filtered systems will be classified into one of four possible risk categories (bins). Unfiltered systems will be classified into one of two categories: one that does not require additional treatment beyond the two disinfectant requirements; and one that requires additional treatment (beyond the requirement for all unfiltered systems to provide two forms of disinfection). The LT2ESWTR also includes requirements for uncovered finished water reservoirs and disinfection profiling and benchmarking.

EPA developed the LT2ESWTR compliance schedule for monitoring, reporting, and treatment requirements to provide maximum compatibility with the Stage 2 DBPR compliance schedule. The compliance schedule is divided into the following four schedules based on population served by the systems treating the water:

- \$ **Schedule 1:** Systems serving 100,000 people or more
- \$ **Schedule 2:** Systems serving 50,000 B 99,999 people
- \$ **Schedule 3:** Systems serving 10,000 B 49,999 people
- \$ **Schedule 4:** Systems serving fewer than 10,000 people

Wholesale water systems' compliance schedule is based on the population of the largest system in the combined distribution system.

**Figure 1-1. General Requirements of the LT2ESWTR**



### **1.2.2 Source Water Monitoring [40 CFR 141.701]**

Large systems (serving 10,000 people or more) that currently provide filtration or that are unfiltered and required to install filtration must conduct source water monitoring for *Cryptosporidium*, *E. coli*, and turbidity.

Small systems (serving fewer than 10,000 people) that currently provide filtration or that are unfiltered and required to install filtration must first monitor for *E. coli* or an alternative indicator approved by the state as a screening analysis. Small systems are subsequently required to monitor for *Cryptosporidium* if the following trigger events occur:

- \$ The annual mean concentration of *E. coli* exceeds 10 *E. coli*/100 mL for systems using lake or reservoir sources;
- \$ The annual mean concentration of *E. coli* exceeds 50 *E. coli*/100 mL for systems using flowing stream sources;
- \$ The level of a state-approved alternate indicator exceeds the state-approved alternative indicator trigger level; or
- \$ The system does not monitor for *E. coli* at least once every 2 weeks for 12 months as required.

Small filtered systems can forgo *E. coli* monitoring and monitor for *Cryptosporidium* instead.

Large and small unfiltered systems that meet all the filtration avoidance criteria of 40 Code of Federal Regulations (CFR) 141.71 must monitor for *Cryptosporidium* unless they provide 3.0-log *Cryptosporidium* inactivation by the time treatment is required.

Large and small filtered systems do not have to conduct source water monitoring if they provide 5.5-log *Cryptosporidium* inactivation by the time treatment is required.

Systems that operate for only part of the year must sample their source water during months that the plant is in operation, unless the state specifies another monitoring period. Systems that must monitor for *Cryptosporidium* and operate plants for less than 6 months per year must collect at least six samples per year for a 24 month period. The samples must be collected at even intervals throughout the period of operation.

New systems and systems that begin using a new surface water or GWUDI source must contact the state regarding their requirements and schedule for conducting source water monitoring.

#### **1.2.2.1 When are systems required to begin source water monitoring? [40 CFR 141.701(c)]**

Systems serving 100,000 people or more must begin source water monitoring no later than October 1, 2006. System serving from 50,000 to 99,999 people must begin source water monitoring no later than April 1, 2007. Systems serving from 10,000 to 49,999 people must begin source water monitoring no later than April 1, 2008. These three system sizes must monitor source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for 24 months. Unfiltered systems must monitor for *Cryptosporidium* at least monthly for 24 months. Small filtered systems (systems serving fewer than 10,000 people) must begin *E. coli* monitoring no later than October 1, 2008 and monitor at least once every 2 weeks for 12 months. Small unfiltered systems and those small filtered systems that exceeded the *E. coli* trigger levels must begin *Cryptosporidium* monitoring no later than April 1, 2010 and monitor at least twice each month for 12 months or at least monthly for 24 months. Wholesale water systems will begin monitoring according to the population of the largest system in the combined distribution system.

Systems are required to conduct a second round of source water monitoring approximately 6 years after the first round of monitoring ends. This will help determine if there has been a significant change in source water quality that would affect treatment requirements.

#### **1.2.2.2 Where are systems required to sample source water? [40 CFR 141.703]**

Systems must collect source water samples for each plant that treats a surface water or GWUDI source at a location prior to any treatment. The state may allow systems to collect samples after chemical treatment if the state determines that collecting a sample before treatment is not feasible and if the treatment is unlikely to have an adverse effect on sample analysis. If more than one plant draws water from the same influent, the state may allow one set of results to be used for multiple plants. Samples must be collected prior to the addition of filter backwash for systems that recycle their filter backwash.

Systems using a presedimentation basin or an off-stream raw water storage reservoir should take source water samples after the presedimentation basin or the off-stream storage reservoir but before any other treatment. Systems collecting samples after a presedimentation basin may not receive credit for the presedimentation basin as a toolbox option. Use of bank filtration during monitoring must be consistent

with routine operational practice, and the state may identify additional reporting requirements to verify operational practices.

Systems using more than one water source must either collect samples at a sampling tap where the sources are combined prior to treatment or must collect samples at each source near the intake on the same day. Samples may be composited from each source based on proportionate flows into one sample prior to sample analysis, or systems may analyze samples separately and calculate a weighted average of results.

### **1.2.3 Disinfection Profiling and Benchmarking Requirements [40 CFR 141.708, 40 CFR 141.709]**

#### **1.2.3.1 Which systems need to develop profiles? [40 CFR 141.708]**

Systems that plan to make a significant change to their disinfection practices based on the results of their first round of source water monitoring must develop disinfection profiles and calculate disinfection benchmarks. Systems must notify the state before making significant changes in their disinfection practices.

#### **1.2.3.2 What if systems previously collected data? [40 CFR 141.709]**

Systems can meet profiling requirements under the LT2ESWTR using previously collected data (i.e., grandfathered data). This data must be equivalent in sample number, frequency, and data quality to data that will be collected under the LT2ESWTR. Use of grandfathered data is allowed if the system has not made a significant change in disinfection practice or changed sources since the data were collected. This will permit most systems that prepared a disinfection profile under the IESWTR or the LT1ESWTR to avoid collecting any new operational data to develop profiles under the LT2ESWTR.

#### **1.2.3.3 If a system developed a profile for *Giardia*, does it have to develop one for viruses? [40 CFR 141.709]**

Systems that produced a disinfection profile for *Giardia* but not viruses under the IESWTR or LT1ESWTR must develop a disinfection profile for viruses under the LT2ESWTR. Systems must use the same monitoring data on which the *Giardia* profile is based. EPA believes that virus profiling is necessary because some of the disinfection processes that systems will select to comply with the LT2ESWTR and Stage 2 DBPR (e.g., chloramines, UV) are relatively less effective against viruses than free chlorine. Systems should refer to EPA's *Disinfection Profiling and Benchmarking Guidance Manual* for details on how to develop a disinfection profile.

### **1.2.4 Treatment Requirements**

#### **1.2.4.1 When do systems have to install additional treatment? [40 CFR 141.713]**

Systems serving 100,000 people or more have to meet any additional *Cryptosporidium* treatment requirements by April 1, 2012 as shown in Table 1-18 and Figure 1-2. Systems serving from 50,000 to 99,999 people have until October 1, 2012; systems serving 10,000 to 49,999 people have until October 1, 2013; and systems serving fewer than 10,000 people have until October 1, 2014 to meet additional treatment requirements. The SDWA section 1412(b)(10) allows states to grant systems an additional 2 years to comply when capital investments are necessary (refer to Appendix H for guidance).

Systems must comply with additional *Cryptosporidium* treatment requirements, determined from source water monitoring, by implementing one or more treatment processes or control strategies from the

microbial toolbox. Most of the toolbox components require submission of documentation to the state demonstrating compliance with design and/or required implementation criteria to receive credit.

#### 1.2.4.2 What are the requirements for *Cryptosporidium* treatment for filtered systems? [40 CFR 141.711]

Filtered systems or systems that are unfiltered and required to install filtration must provide the level of treatment for *Cryptosporidium* specified in Table 1-1 based on their bin classification.

**Table 1-1. Level of Treatment Required for Filtered Systems**

If the source water <i>Cryptosporidium</i> concentration in oocyst/L is...	And the system uses the following filtration treatment in full compliance with SWTR, IESWTR, and LT1ESWTR (as applicable), then the additional treatment requirements are. . .			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
<0.075 (Bin 1)	No additional treatment	No additional treatment	No additional treatment	No additional treatment
≥0.075 and <1.0 (Bin 2)	1.0-log treatment	1.5-log treatment	1.0-log treatment	(1)
≥1.0 and <3.0 (Bin 3)	2.0-log treatment	2.5-log treatment	2.0-log treatment	(2)
≥3.0 (Bin 4)	2.5-log treatment	3.0-log treatment	2.5-log treatment	(3)

(1) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.

(2) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.

(3) As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

Filtered systems must use at least one of the management and treatment options listed in the microbial toolbox (see Table 1-2) to meet the additional *Cryptosporidium* treatment requirements identified for each bin. Systems classified in Bins 3 and 4 (the highest *Cryptosporidium* levels) must achieve at least 1.0-log of additional treatment using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV as specified in the microbial toolbox.

#### 1.2.4.3 What are the requirements for *Cryptosporidium* treatment for unfiltered systems? [40 CFR 141.712]

Unfiltered systems with a mean *Cryptosporidium* concentration of 0.01 oocysts/L or less must provide at least 2.0-log *Cryptosporidium* inactivation. Unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L must provide at least 3.0-log *Cryptosporidium* inactivation.

Unfiltered systems must meet the combined *Cryptosporidium*, *Giardia lamblia*, and virus inactivation requirements using a minimum of two disinfectants. Each disinfectant must be able to achieve the total inactivation required for *Cryptosporidium*, *Giardia lamblia*, or viruses. For example, a system may use UV to meet *Cryptosporidium* and *Giardia* inactivation requirements and chlorine to meet virus

inactivation requirements. To meet the *Cryptosporidium* inactivation requirements, systems must use chlorine dioxide, ozone, or UV.

Disinfection requirements under the LT2ESWTR are more stringent for unfiltered systems than filtered systems. The following unfiltered systems will incur a TT violation:

- \$ Systems using chlorine dioxide or ozone that fail to achieve the *Cryptosporidium* log inactivation on more than 1 day in the calendar month.
- \$ Systems using UV light that fail to achieve the *Cryptosporidium* log inactivation required in at least 95 percent of the water that is delivered to the public during each calendar month.

### 1.2.5 Microbial Toolbox Options Available to Systems

Systems can implement a variety of source, pre-filtration, treatment, additional filtration, and inactivation toolbox components to receive *Cryptosporidium* credit, as summarized in Table 1-2.

**Table 1-2. Microbial Toolbox: Options and Credits**

Toolbox option	<i>Cryptosporidium</i> credits
<i>Source Toolbox Components</i>	
Watershed control program	0.5-log credit. (Section 1.2.5.1)
Alternative source/intake management	No prescribed credit. (Section 1.2.5.2)
<i>Pre-filtration Toolbox Components</i>	
Presedimentation basin with coagulation	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or state-approved performance criteria. Basins must operate continually with coagulant addition and all plant flow must pass through the basins. (Section 1.2.5.3)
Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. (Section 1.2.5.4)
Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback. Aquifer must contain granular material and in at least 90 percent of the length of a core, grains less than 1.0 mm in diameter constitute 10 percent of the material. Average turbidity must be less than 1 Nephelometric Turbidity Unit (NTU). No presumptive credit for bank filtration that serves as pretreatment when source water monitoring is performed from the well (after bank filtration). (Section 1.2.5.5)

<b>Toolbox option</b>	<b><i>Cryptosporidium</i> credits</b>
<i>Treatment Performance Toolbox Components</i>	
Combined filter performance	0.5-log credit for CFE turbidity $\leq 0.15$ NTU in at least 95 percent of samples each month. (Section 1.2.5.6)
Individual filter performance	0.5-log credit (in addition to the combined filter performance credit) for IFE $\leq 0.15$ NTU in 95% of samples each month and no filter $> 0.3$ NTU in two consecutive measurements. (Section 1.2.5.7)
Demonstration of performance	Credit based on demonstration to the state. (Section 1.2.5.8)
<i>Additional Filtration Toolbox Components</i>	
Bag or cartridge filters (individual filters)	Up to 2.0-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. (Section 1.2.5.9)
Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. (Section 1.2.5.9)
Membrane filtration	Log removal credit up to the removal efficiency demonstrated during challenge test if supported by direct integrity testing. (Section 1.2.5.10)
Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. (Section 1.2.5.11)
Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. (Section 1.2.5.12)
<i>Inactivation Toolbox Components</i>	
Chlorine dioxide	Log credit based on measured contact time (CT) in relation to CT table. (Section 1.2.5.13)
Ozone	Log credit based on measured CT in relation to CT table. (Section 1.2.5.14)
UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. (Section 1.2.5.15)

### **1.2.5.1 Watershed Control Program [40 CFR 141.716(a)]**

Filtered systems must submit their watershed control programs to the state for approval to qualify for 0.5-log credit of *Cryptosporidium* removal. Unfiltered systems may not claim credit for *Cryptosporidium* removal under this option. Systems must notify the state of their intention to apply the watershed control program no later than 2 years prior to their specific treatment compliance date. The proposed watershed control program must be submitted to the state at least 1 year prior to their treatment compliance date.

Systems with existing watershed control programs in place prior to January 5, 2006, may also seek the watershed control credit, as long as the watershed control plan contains the information outlined below.

### Initial Watershed Control Plan

A system's watershed control plan must be approved by the state for the system to receive the watershed control program treatment credit. If the plan is approved or if the system agrees to implement the state's conditions for approval, the system is awarded a 0.5-log credit for *Cryptosporidium* removal.

The watershed control plan must include the following elements:

- \$ Identification of an "area of influence" (the area to be considered in future watershed surveys) outside of which there is little chance for *Cryptosporidium* or fecal contamination to affect the drinking water intake.
- \$ Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources of contamination on the system's source water quality.
- \$ An analysis of control measures that could mitigate the sources of *Cryptosporidium* contamination identified during the vulnerability analysis. The analysis must address the measure's relative effectiveness in reducing *Cryptosporidium* loading to the source water and its feasibility and sustainability.
- \$ A plan that establishes goals and defines and prioritizes specific actions to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their role(s), identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

### Maintaining State Approval for Treatment Credit

Initial state approval of a watershed control plan and its associated treatment credit is valid unless withdrawn by the state. Systems must complete the following actions to maintain state approval and the 0.5-log credit:

- \$ Submit an annual watershed control program status report to the state by a date determined by the state. The annual watershed control program status report must describe the following items:
  - The system's implementation of the approved plan and an assessment of the adequacy of the plan to meet its goals.
  - How the system is addressing any shortcomings in plan implementation, including those previously identified by the state or as the result of the watershed survey.
  - A description of any significant changes that have occurred in the watershed since the last watershed survey. A PWS must notify the state before making any significant changes, and must list actions that the system will take to mitigate any changes that are likely to reduce the level of source water protection.
- \$ Conduct watershed sanitary survey every 3 years for CWSs and every 5 years for NCWSs and submit the survey report to the state. The survey must be conducted



according to state guidelines and by qualified persons approved by the state. The survey needs to cover the area of the watershed identified as the area of influence, assess the implementation of actions to reduce source water *Cryptosporidium* levels, and identify any significant new sources of *Cryptosporidium*. If the state determines that significant changes have occurred since the previous watershed sanitary survey, the system must have another watershed sanitary survey on a state-approved schedule, which may be earlier than every 3 or 5 years.

- \$ The PWS must make the watershed control plan, annual reports, and watershed sanitary survey reports available to the public upon request. The state may allow certain information to be withheld from the above reports based on water supply security considerations.

If the state determines that the system is not carrying out the approved watershed control plan, the state may revoke the watershed control program treatment credit.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-3. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-3. Reporting Deadlines for Systems Choosing the Watershed Control Program Toolbox Option**

<b>Systems must submit the following information</b>	<b>On the following schedule</b>
Notice of intention to develop or continue an existing watershed control program.	No later than 2 years before the applicable treatment compliance date specified in Table 1-18.
Submit watershed control program plan to state.	No later than 1 year before the applicable treatment compliance date specified in Table 1-18.
Annual watershed control program status report.	Every 12 months, beginning 1 year after the applicable treatment compliance date specified in Table 1-18.

#### **1.2.5.2 Alternative Source [40 CFR 141.716(b)]**

If approved by the state, a system can be classified into a bin based on additional monitoring that is conducted concurrently with existing source water monitoring and reflects either a different intake location (either in the same source or for an alternate source) or a different procedure for managing the timing or level of withdrawal from the source.

Sampling and analysis of *Cryptosporidium* in the concurrent round of monitoring must conform to the monitoring requirements used to determine bin classification. Systems must submit the results of all their monitoring to the state along with supporting information that documents the operating conditions under which the samples were collected.

If the state classifies the system in a bin based on monitoring that reflects a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or use the intake management strategy. The deadline for relocation of the new intake is specified in Table 1-4. The state may specify additional reporting requirements to verify operational practices.

**Table 1-4. Reporting Deadlines for Alternative Source/Intake Management**

Systems must submit the following information	On the following schedule
Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date specified in Table 1-18.

**1.2.5.3 Pre-sedimentation with Coagulant [40 CFR 141.717(a)]**

Presedimentation basins with coagulant addition may receive 0.5-log *Cryptosporidium* removal credit during any month that the system meets the following criteria:

- \$ The presedimentation basin must be in continuous operation and must treat all of the plant flow taken from a surface water or GWUDI source.
- \$ A coagulant must be continuously added to the presedimentation basin while the plant is in operation.
- \$ The presedimentation basin must achieve 0.5-log (68 percent) reduction of influent turbidity. The reduction must be calculated as follows:  $\log_{10}$  (monthly mean of daily influent turbidity) -  $\log_{10}$  (monthly mean of daily effluent turbidity). The system may also comply with state-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material.

Systems must measure presedimentation basin influent and effluent turbidity at least once per day or more frequently as determined by the state.

**Table 1-5. Reporting Deadlines for Systems Choosing the Presedimentation Toolbox Option**

Systems must submit the following information	On the following schedule
Monthly verification of the following: <ul style="list-style-type: none"><li>- Continuous basin operation.</li><li>- Treatment of 100% of the flow.</li><li>- Continuous addition of a coagulant.</li><li>- At least 0.5-log mean removal of influent turbidity or compliance with alternative state-approved performance criteria.</li></ul>	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

**1.2.5.4 Two-stage Lime Softening [40 CFR 141.717(b)]**

The LT2ESWTR requires plants to meet the following criteria in order to receive 0.5-log credit towards additional *Cryptosporidium* during any month chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration: both softening stages must treat all plant flow from the surface or GWUDI source, and no water flow may bypass either of the treatment stages.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-6. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-6. Reporting Deadlines for Systems Choosing the Two-stage Lime Softening Toolbox Option**

<b>Systems must submit the following information</b>	<b>On the following schedule</b>
<p>Monthly verification of the following:</p> <ul style="list-style-type: none"> <li>- Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration.</li> <li>- Both stages treated 100% of the plant flow.</li> </ul>	<p>Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment date specified in Table 1-18.</p>

#### **1.2.5.5 Bank Filtration [40 CFR 141.717(c)]**

The LT2ESWTR specifies the following design requirements for systems to receive removal credit for bank filtration:

- \$ Wells must draw from granular aquifers that are comprised of clay, silt, sand, or pebbles or larger particles. Minor cement may be present. Systems must characterize the aquifer at the well site by extracting a core from the aquifer to demonstrate that grains less than 1.0 mm in diameter are present in at least 1- percent of the material in at least 90 percent of the core length.
- \$ Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. Only horizontal and vertical wells are eligible for treatment credit.
  - The ground water flow path for vertical wells is the distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary as defined in Federal Emergency Management Agency (FEMA) flood hazard maps) to the well screen.
  - The ground water flow path for horizontal wells is the distance from the river bed under normal flow conditions to the closest horizontal well lateral screen.
- \$ Turbidity must be monitored at least once every 4 hours when the bank filtration process is in operation. If at any time the monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report the results to the state and conduct an assessment to determine the cause of the high turbidity levels. This assessment must be completed within 30 days. If the state determines that microbial removal has been compromised, treatment credit may be revoked until the system implements corrective actions approved by the state to correct the problem.
- \$ Springs and infiltration galleries are not eligible to receive bank filtration treatment credit, but are eligible for credit under Demonstration of Performance (see section 1.2.5.8).

- \$ The state may also offer treatment credit based on a demonstration of performance study. The credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the requirements specified above if:
- The study follows a state-approved protocol and involves *Cryptosporidium* or a surrogate for *Cryptosporidium* and hydrogeologic and water quality parameters during the full range of operating conditions; and
  - The study includes sampling from both the production well(s) and monitoring well(s) that are screened and located on the shortest flow path between the surface water source and the production wells.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-7. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-7. Reporting Deadline for Systems Choosing the Bank Filtration Toolbox Option**

Systems must submit the following information	On the following schedule
Initial demonstration of the following: <ul style="list-style-type: none"> <li>- Unconsolidated, predominantly sandy aquifer.</li> <li>- Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log-credit).</li> </ul>	No later than the applicable treatment compliance date specified in Table 1-18.
If monthly average of daily max turbidity is greater than 1 NTU, then system must report result and submit an assessment of the cause.	Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### **1.2.5.6 Combined Filter Performance [40 CFR 141.718(a)]**

Systems using conventional or direct filtration treatment may obtain an additional 0.5-log *Cryptosporidium* removal credit if the CFE turbidity measurements taken for any month are less than or equal to 0.15 NTU in at least 95 percent of the measurements. Note that systems may receive both the CFE and IFE performance credit during any month the system meets the criteria in this section and in section 1.2.5.7, below.

Compliance with the LT2ESWTR is determined in the same manner as measurements taken for the IESWTR and LT1ESWTR. In other words, the LT2ESWTR does not require any additional monitoring from the IESWTR and LT1ESWTR.

The monitoring frequency and compliance calculation requirements consist of measuring turbidity at 4-hour intervals (or more frequently) with 95 percent of the measurements from each month being less than or equal to 0.15 NTU.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-8. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-8. Reporting Deadlines for Systems Choosing the Combined Filter Performance Toolbox Option**

Systems must submit the following information	On the following schedule
Monthly verification of CFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date as specified in Table 1-18.

#### **1.2.5.7 Individual Filter Performance [40 CFR 141.718(b)]**

The LT2ESWTR allows systems using conventional or direct filtration treatment to claim an additional 0.5-log *Cryptosporidium* removal credit for any month in which the plant meets both of the following IFE turbidity requirements:

- \$ IFE turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the values recorded at each filter in each month; and
- \$ No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

The monitoring frequency and compliance calculation requirements consist of measuring turbidity every 15 minutes with 95 percent of the measurements from each month being less than or equal to 0.15 NTU.

As previously mentioned, the LT2ESWTR specifies that no individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart. However, if the individual filter is not providing water which contributes to the CFE (i.e., it is not operating, is filtering to waste, or its filtrate is being recycled), the system does not need to report the turbidity for that specific filter.

If a system received treatment credit for individual filter performance and fails to meet the requirements above during any month, the system will not receive a TT violation if:

- \$ The state determined that the failure was due to unusual and short-term circumstances that could not be prevented through optimizing treatment plant design, operation, and maintenance, and
- \$ The system has not had more than two such failures in any calendar year.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-9. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-9. Reporting Deadlines for Systems Choosing the Individual Filter Performance Toolbox Options**

Systems must submit the following information	On the following schedule
<p>Monthly verification of the following:</p> <ul style="list-style-type: none"> <li>- IFE turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter.</li> <li>- No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.</li> </ul>	<p>Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.</p>

**1.2.5.8 Demonstration of Performance: What if a system can perform better than the presumptive credit specified in the toolbox? [40 CFR 141.718(c)]**

Systems may also receive treatment credit for drinking water treatment processes based on a demonstration of performance study. The credit awarded by the state through this process may be greater than or less than the treatment credits prescribed by the LT2ESWTR. In addition, credits may be awarded to treatment processes that do not meet the criteria for prescribed credits. The study must follow a state-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will meet under the full range of operating conditions.

State approval must be in writing and may include monitoring and treatment performance criteria for the system to demonstrate and report routinely to maintain the treatment credit. The state may also designate criteria to verify that the system is meeting the demonstration of performance conditions.

The demonstration of performance applies to the physical removal processes at a treatment plant. The LT2ESWTR does not allow systems to claim presumptive credit for the toolbox options listed below if that component is included in the demonstration of performance credit.

\$	Presedimentation	\$	Membrane filters
\$	Two-stage lime softening	\$	Bag and cartridge filters
\$	Bank filtration	\$	Second stage filtration
\$	Combined or individual filter performance	\$	

For example, if a plant receives a demonstration of performance credit for a treatment train (which may include presedimentation, flocculation, sedimentation, filtration, disinfection, etc.), the system may not also receive credit for a presedimentation basin or for achieving the lower finished water turbidity of the combined filter performance option. Note that demonstrating performance for a disinfection process (chlorine dioxide, ozone, or UV) is addressed under the disinfectant toolbox option and not this option.

States may award a lower level of *Cryptosporidium* treatment credit towards compliance for the LT2ESWTR to a system where, based on site-specific information, a plant or a unit process achieves *Cryptosporidium* treatment efficiency less than a presumptive credit specified in the LT2ESWTR.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-10. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-10. Reporting Deadlines for Systems Choosing the Demonstration of Performance Toolbox Option**

Systems must submit the following information	On the following schedule
Results from testing following a state-approved protocol.	No later than the applicable treatment compliance date specified in Table 1-18.
As required by the state, monthly verification of operation within conditions of state approval for demonstration of performance credit.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### 1.2.5.9 Bag and Cartridge Filtration [40 CFR 141.719(a)]

Bag and cartridge filtration processes that meet the EPA definition and demonstrate *Cryptosporidium* removal through challenge testing may receive *Cryptosporidium* removal credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operating in series by meeting the following conditions:

- \$ The treatment credit awarded must be based on the removal efficiency demonstrated during challenge testing.
- \$ A 1.0-log factor of safety for individual bag or cartridge filter and a 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine the removal credit. The safety factor is applied because bag and cartridge filters cannot have their integrity directly tested; hence, there are no means of verifying their removal efficiency during routine use. Results from challenge testing conducted prior to January 5, 2006, may be used if the testing meets all of the criteria described in this section.
  - Challenge testing must be performed under the same conditions and configurations that the system will use for *Cryptosporidium* removal. For instance, the challenge test must be conducted on full-scale bag or cartridge filters and filter housing and pressure vessels must be identical in material and construction to those used by the system.
  - Systems may conduct challenge testing using *Cryptosporidium* or a surrogate that is not removed more efficiently than *Cryptosporidium*. This challenge particulate must be measured using an analytical method capable of quantifying the specific microorganism or surrogate used in the test (i.e., turbidity may not be used to determine the concentration of the challenge particulate).
  - The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (i.e., filtrate detection limit) and must be calculated using the following equation

$$\text{Maximum Feed Concentration} = 1 \times 10^4 \times (\text{Filtrate Detection Limit})$$

- The maximum design flow rate for the filter as specified by the manufacturer must be used during testing.
- Each filter must be tested for a duration that is sufficient to reach 100 percent of the terminal pressure drop, which will establish the maximum pressure drop for the filter.
- The removal efficiency of a filter is calculated from the challenge test results using the following equation:

$$LRV = \text{LOG}_{10}(C_f) - \text{LOG}_{10}(C_p)$$

where LRV = log removal value;  $C_f$  = feed concentration measured during the challenge test; and  $C_p$  = the filtrate concentration measured during the challenge test. Where the challenge particulate is not detected in the filtrate,  $C_p$  will be the detection limit. The same units must be used for the feed and filtrate concentrations.

- Challenge testing on each filter must be conducted during three periods over the filtration cycle: within 2 hours of new filter start-up; when the pressure drop is between 45 and 55 percent of terminal pressure drop; and at the end of the cycle when the pressure drop has reached 100 percent of the terminal pressure drop. The LRV must be calculated for each of these three periods. The lowest observed LRV for the filter ( $LRV_{\text{filter}}$ ) must be used.
- The overall removal efficiency for the filter product line must be set equal to the lowest  $LRV_{\text{filter}}$  if less than 20 filters are tested. The removal efficiency is set to the 10<sup>th</sup> percentile of the set of  $LRV_{\text{filter}}$  values for various filters tested when 20 or more filters are tested. The percentile is calculated as follows:

$$i/(n+1)$$

where  $i$  is the rank of  $n$  individual data points ordered lowest to highest. The 10<sup>th</sup> percentile may also be calculated using linear interpolation.

- If a filter is modified in a way that could change the removal efficiency of the filter, challenge testing must be conducted to demonstrate the removal efficiency of the modified filter.

All reporting requirements for the SWTR, IESWTR, and LT1ESWTR are still applicable; the LT2ESWTR does not modify or replace any previous rule requirements. The location of filter effluent turbidity monitoring for compliance with the IESWTR and LT1ESWTR does not change with the installation of a bag or cartridge filter as a secondary filtration process. Therefore, a system would still monitor filter effluent turbidity after the primary filters for compliance with the IESWTR and LT1ESWTR.

For routine compliance reporting, the Rule requires verification that all flow was treated by the bag or cartridge filter. One possible approach states may elect to use for flow verification is to have operators certify each month that all flow was treated by the filter. States may require additional reporting at their discretion.



Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-11. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-11. Reporting Deadlines for Systems Choosing the Bag Filters and Cartridge Filters Toolbox Option**

Systems must submit the following information	On the following schedule
Demonstration that the following criteria are met: <ul style="list-style-type: none"> <li>- Process meets the definition of bag or cartridge filtration.</li> <li>- Removal efficiency established through challenge testing that meets criteria in this section.</li> </ul>	No later than the applicable treatment compliance date specified in Table 1-18.
Monthly verification that 100% of plant flow was filtered.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### 1.2.5.10 Membrane Filtration [40 CFR 141.719(b)]

Systems receive treatment credit for membrane filtration. Membrane cartridge filters (MCF) that meet the definition of membrane filtration are also eligible for this credit. The treatment credit awarded is equal to the lower of the values determined as follows:

- \$ The removal efficiency demonstrated during challenge testing, described below.
- \$ The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process.

Membrane filters used by systems must undergo challenge testing to evaluate removal efficiency. Challenge testing conducted prior to January 5, 2006 may be used if it meets the criteria outlined below. Challenge testing results must be reported to the state and must be conducted according to the following criteria:

- \$ Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or on a smaller-scale membrane module, identical in material and similar in construction to the modules used in the system's treatment facility.
- \$ Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is not removed more efficiently than *Cryptosporidium*. This challenge particulate must be measured using an analytical method capable of quantifying the specific microorganism or surrogate used in the test (i.e., turbidity may not be used to determine the concentration of the challenge particulate).
- \$ The maximum feed water concentration used is based on the detection limit of the challenge particulate in the filtrate and is determined using the following equation:

$$\text{Maximum Feed Concentration} = 3.16 \times 10^6 \times (\text{Filtrate Detection Limit})$$

\$ Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the membrane module manufacturer.

\$ Removal efficiency must be calculated from the challenge test results using this equation:

$$\text{LRV} = \text{Log}_{10}(\text{C}_f) - \text{Log}_{10}(\text{C}_p)$$

where LRV = the log removal value demonstrated during the challenge test;  $\text{C}_f$  = the feed concentration; and  $\text{C}_p$  = the filtrate concentration. The units for feed and filtrate concentration must be the same. If the  $\text{C}_p$  is less than the detection limit, the value of the detection limit must be used for  $\text{C}_p$ . The LRV must be calculated for each membrane module evaluated by challenge testing.

\$ The overall removal efficiency for the membrane filtration process must be set equal to the lowest removal efficiency ( $\text{LRV}_{\text{C-test}}$ ) if less than 20 modules are tested. The removal efficiency is set to the 10<sup>th</sup> percentile of the set of  $\text{LRV}_{\text{C-test}}$  values when 20 or more modules are tested. The percentile is calculated as follows:

$$i/(n+1)$$

where  $i$  is the rank of  $n$  individual data points ordered lowest to highest. The 10<sup>th</sup> percentile may also be calculated using linear interpolation.

\$ A quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability must be established by challenge testing (e.g., bubble point test, diffusive airflow test, pressure/vacuum decay test). The test must be applied to all production membrane modules that were not directly challenge tested to verify *Cryptosporidium* removal. If the QCRV is not met by a production module, the production module is not eligible for the treatment credit.

\$ If a membrane module is modified in a way that could change the removal efficiency of the module, challenge testing must be conducted to demonstrate the removal efficiency of the modified module, and a new QCRV value must be established. All results must be submitted to the state.

Direct integrity testing must demonstrate removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and must meet the requirements outlined below:

\$ The test must be independently applied to each membrane unit in service, where a unit is a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system.

\$ The test method must have a resolution of 3 micrometers or less.

\$ The test must be sensitive enough to verify the log treatment credit awarded to the membrane filtration process by the state using one of the two approaches described below:

- If the direct integrity test uses an applied pressure or vacuum, the test sensitivity must be determined using this equation:

$$LRV_{DIT} = \text{Log}_{10}(Q_p / (\text{VCF} \times Q_{\text{breach}}))$$

where  $LRV_{DIT}$  = the sensitivity of the direct integrity test;  $Q_p$  = total design filtrate flow from the membrane unit;  $Q_{\text{breach}}$  = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The VCF is the ratio of suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

- If the direct integrity test uses a particulate or molecular marker, the test sensitivity must be determined using this equation:

$$LRV_{DIT} = \text{Log}_{10}(C_f) - \text{Log}_{10}(C_p)$$

where  $LRV_{DIT}$  = the sensitivity of the direct integrity test;  $C_f$  = the typical feed concentration of the marker used in the test; and  $C_p$  = the filtrate concentration of the marker from an original membrane unit.

- \$ A control limit must be established within the sensitivity limits of the test that is indicative of a membrane unit that was used in the integrity test and can meet the removal credit awarded by the state.
- \$ If the test results exceed the control limit established, the membrane unit must be removed from service. A new test must be conducted, and the unit may be returned to service when the test results are within the established control limit.
- \$ Direct integrity testing must be conducted on each membrane unit at least once each day the unit is in operation. Less frequent testing may be approved by the state.

Systems must conduct continuous indirect integrity monitoring on each membrane unit. All results of indirect integrity monitoring that triggered direct integrity testing and the corrective action taken in each case must be submitted monthly to the state.

- \$ Unless the state approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.
- \$ Monitoring must be conducted at least once every 15 minutes on each membrane unit.
- \$ If filtrate turbidity is above 0.15 NTU in two consecutive 15-minute readings, direct integrity testing must be performed immediately.
- \$ If the state-approved parameter exceeds the state-approved control limit for a period greater than 15 minutes, direct integrity testing must be performed immediately.

Additional requirements and guidance for conducting the tests to comply with the LT2ESWTR are provided in EPA's *Membrane Filtration Guidance Manual*.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-12. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-12. Reporting Deadlines for Systems Choosing the Membrane Filtration Toolbox Option**

Systems must submit the following information	On the following schedule
<p>Results of verification testing demonstrating the following:</p> <ul style="list-style-type: none"> <li>- Removal efficiency established through challenge testing that meets criteria in this section.</li> <li>- Integrity test method and parameters including resolution, sensitivity, test frequency, control limits, and associated baseline.</li> </ul>	<p>No later than the applicable treatment compliance date specified in Table 1-18.</p>
<p>Monthly report summarizing the following:</p> <ul style="list-style-type: none"> <li>- All direct integrity tests above the control limit.</li> <li>- If applicable, any turbidity or state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.</li> </ul>	<p>Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.</p>

#### 1.2.5.11 Second Stage Filtration [40 CFR 141.719(c)]

Under the LT2ESWTR, a system that employs a second, separate filtration stage meeting the following criteria may receive 0.5-log credit for *Cryptosporidium* removal:

- \$ The first stage of filtration is preceded by a coagulation step.
- \$ The second stage of filtration is comprised of sand, dual media, granular activated carbon (GAC), or other fine grain media.
- \$ Both filtration stages treat 100 percent of plant flow.

A cap, such as a GAC, on a single stage of filtration is not eligible for this removal credit. The treatment credit must be based on the state's assessment of the design characteristics of the filtration process.

Reporting requirements for the LT2ESWTR do not take the place of the IESWTR and LT1ESWTR reporting requirements. Specifically, the turbidity of the combined and IFE from the first filtration stage must be reported as required by the IESWTR and LT1ESWTR.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-13. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-13. Reporting Deadlines for Systems Choosing the Second Stage Filtration Toolbox Option**

Systems must submit the following information	On the following schedule
Monthly verification that 100% of flow was filtered through both stages and that the first stage was preceded by a coagulation step.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### 1.2.5.12 Slow Sand Filters [40 CFR 141.719(d)]

A system integrating a slow sand filtration process for the second stage of filtration meeting the following criteria can receive 2.5-log credit for *Cryptosporidium* removal:

- \$ No disinfectant residual is present in the influent to the slow sand filtration process.
- \$ Both filtration stages treat 100 percent of plant flow.

The treatment credit must be based on the state's assessment of the design characteristics of the filtration process. However, this does not apply to treatment credit awarded to slow sand filtration as a primary filtration process.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-14. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-14. Reporting Deadlines for Systems Choosing the Slow Sand Filtration Option**

Systems must submit the following information	On the following schedule
Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from Subpart H sources.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### 1.2.5.13 Chlorine Dioxide [40 CFR 141.720(a) through (c)]

Systems using chlorine dioxide must calculate CT to determine their inactivation credit for *Cryptosporidium*. CT is the product of the disinfectant concentration (C, in mg/L) and disinfectant contact time (T, in minutes). Systems must calculate CT values for each day based on measurements of C and T during peak hourly flow and use the table in §141.720(b)(1) to determine their inactivation credit or use alternative CT values approved by the state for a system. Systems with several disinfection segments (i.e., a treatment unit process with a measurable disinfectant residual level and a liquid volume) may calculate CT values for each segment and sum those values to obtain a total CT value, then use the table in §141.720(b)(1) to determine their inactivation credit.

Systems may also conduct a site-specific inactivation study to determine the CT values necessary to meet a specified *Cryptosporidium* log inactivation level using a state-approved protocol. The alternative CT values determined from the site-specific study and the method of calculation must be approved by the state to ensure that the CT values are adequate to achieve the inactivation required under the LT2ESWTR. EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for conducting a site-specific inactivation study.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-15. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-15. Reporting Deadlines for Systems Choosing the Chlorine Dioxide Toolbox Option**

Systems must submit the following information	On the following schedule
Summary of CT values for each day as described in §141.720(b)(1).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### **1.2.5.14 Ozone [40 CFR 141.720(a) through (c)]**

Systems using ozone must calculate CT values using methods similar to those for chlorine dioxide. Unless the state approves alternative CT values for a system, systems must use the table in §141.720(b)(2) to determine *Cryptosporidium* log inactivation credit. Systems should refer to EPA's *LT2ESWTR Toolbox Guidance Manual* for guidance on calculating CT values for different disinfection reactor designs and operations.

As with chlorine dioxide, systems may also conduct a site-specific inactivation study to determine the CT values necessary to meet a specified *Cryptosporidium* log inactivation level using a state-approved protocol. The alternative CT values determined from the site-specific study and the method of calculation must be approved by the state to ensure that the CT values are adequate to achieve the inactivation required under the LT2ESWTR.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-16. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-16. Reporting Deadlines for Systems Choosing the Ozone Toolbox Option**

Systems must submit the following information	On the following schedule
Summary of CT values for each day based on the table in §141.720(b)(2).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

#### **1.2.5.15 Ultraviolet Light [40 CFR 141.720(d)]**

Systems may claim credit for UV processes for inactivation of *Cryptosporidium*, *Giardia lamblia*, and viruses. The allowable inactivation credit for each pathogen must be based on the UV dose delivered by the system's UV reactors in relation to the UV dose table in §141.720(d). The UV dose values in the dose table are only applicable to post-filter application of UV in systems that filter and to unfiltered systems that meet all the filtration avoidance criteria of §141.71. Systems may be able to receive credit for up to 4.0-log inactivation of *Cryptosporidium*, *Giardia lamblia*, and viruses. The log credits included in the UV dose table are for UV light at a wavelength of 254 nm, as produced by a low pressure mercury vapor lamp.

Systems can apply the dose table to UV reactors with other lamp types through reactor validation testing (e.g., performance demonstration). The validation testing must demonstrate the operating conditions under which the reactor can deliver the necessary UV dose, including flow rate, UV intensity, and UV lamp status. Systems must account for the following:

- \$ The UV absorbance of the water
- \$ Lamp fouling and aging
- \$ Measurement uncertainty of on-line sensors
- \$ UV dose distributions from the velocity profiles through the reactor
- \$ Failure of UV lamps or other system components
- \$ Inlet and outlet piping or channel configurations of the UV reactor.

Validation testing must include full scale testing for a reactor that conforms to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp. The state may also approve an alternative approach to validation testing.

Systems must monitor their UV reactors to demonstrate that they maintain validated operating conditions during routine use. Systems must monitor for UV intensity as measured by a UV sensor, flow rate, and lamp status and for any other parameters required by the state. In addition, systems need to check the calibration of UV sensors and recalibrate them in accordance with a protocol approved by the state. EPA's *UV Disinfection Guidance Manual* provides a protocol for validating reactors and guidance on the design and implementation of UV systems. Systems must treat at least 95 percent of water delivered to the public each month to receive treatment credit.

Systems must report to the state any toolbox options used to comply with the *Cryptosporidium* TT requirement in accordance with Table 1-17. The state may include additional reporting requirements, if it determines they are necessary.

**Table 1-17. Reporting Deadlines for Systems Choosing the UV Toolbox Option**

Systems must submit the following information	On the following schedule
Validation test results demonstrating operating conditions that achieve required UV dose.	No later than the applicable treatment compliance date specified in Table 1-18.
Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in §141.720(d).	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date specified in Table 1-18.

### 1.2.6 Uncovered Finished Reservoir Requirements [40 CFR 141.714]

Systems using uncovered finished water storage facilities must notify the state of any uncovered finished water storage facilities no later than April 1, 2008.

By April 1, 2009, systems must either:

- \$ Cover any uncovered finished water storage facility; or
- \$ Treat the discharge from the uncovered finished water storage facility to the distribution system to achieve at least 4.0-log virus, 3.0-log *Giardia lamblia*, and 2.0-log *Cryptosporidium* inactivation and/or removal using a state-approved protocol.

### **1.2.7 PWS Recordkeeping Requirements [40 CFR 141.722]**

Systems must keep results from the initial round and the second round of source water monitoring until 3 years after either bin classification (filtered systems) or determination of the mean *Cryptosporidium* level (unfiltered systems). Systems must keep a record of any notification to the state that they will not conduct source water monitoring because they are a filtering system that will provide at least 5.5-log treatment or a ground water system that will provide 3.0-log inactivation for 3 years. Systems must keep the results of treatment monitoring associated with microbial toolbox options and with uncovered finished water reservoirs for 3 years.

### **1.2.8 Public Notification of Drinking Water Violations [40 CFR 141.211, Subpart Q, 40 CFR 141 Appendix A]**

Under LT2ESWTR there are two types of violations that require Tier 2 or Tier 3 notification. Tier 2 notifications are for TT violations, and failure to take at least three *Cryptosporidium* samples. Tier 3 notifications are for monitoring, analytical methods, and reporting violations.

#### **1.2.8.1 What are examples of a violation requiring Tier 2 notification?**

A Tier 2 public notification is required for failure to:

- \$ Collect 3 or more *Cryptosporidium* samples.
- \$ Determine and report the bin classification or the mean *Cryptosporidium* level after initial or second round of source water monitoring. However, public notice is not required if the system is complying with a state-approved schedule to address the violation.
- \$ Notify the state of an uncovered finished water reservoir and install treatment or cover the reservoir by the appropriate treatment compliance date.
- \$ Report source water monitoring results and meet TT requirements for unfiltered systems.
- \$ Install the level and type of treatment appropriate for the system's bin classification by the appropriate treatment compliance date.

#### **1.2.8.2 What are examples of a violation requiring Tier 3 notification?**

A Tier 3 public notification of monitoring and testing procedure violations is required for failure to:

- \$ Conduct source water monitoring (except when a Tier 2 notice is required due to failure to collect 3 or more *Cryptosporidium* samples).
- \$ Submit a sampling schedule to the state.



- \$ Collect samples in accordance with the sampling schedule (e.g., sampling location, sampling within 2 days before or after the scheduled date).
- \$ Use an approved laboratory and an approved analytical method.
- \$ Notify the state before making a significant change in disinfection.
- \$ Develop disinfection profiles and benchmarks.
- \$ Report source water monitoring results (initial or second round).

More information on public notification requirements can be found at [www.epa.gov/safewater/pn.html](http://www.epa.gov/safewater/pn.html).

### 1.2.9 Consumer Confidence Reports Requirements

The LT2ESWTR does not specifically modify the CCR Rule requirements. However, CCRs must contain any violations of TT requirements or other violations of NPDWR requirements. This includes any such violations of the LT2ESWTR.

**More information can be obtained from:**

- \$ The Long Term 2 Enhanced Surface Water Treatment Rule 71 *FR* 653 (January 5, 2006); and [www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2)
- \$ The EPA Safe Drinking Water Hotline, Telephone: 1.800.426.4791
- \$ EPA's CCR Web site: [www.epa.gov/safewater/ccr1.html](http://www.epa.gov/safewater/ccr1.html)

## 1.3 Requirements of the Rule: States or Other Primacy Agencies

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The following rule requirements are from the LT2ESWTR published in the *Federal Register* on January 5, 2006 (71 *FR* 653). For a copy of the actual rule language, see Appendix B, or visit EPA's Web site at [www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2) for a copy of the *Federal Register* notice.

### 1.3.1 Special Primacy Requirements [40 CFR 142.16]

In order to receive primacy for the LT2ESWTR, states must adopt regulations no less stringent than this rule. States must submit a primacy application consisting of revisions to their programs, regulations, or authorities no later than January 5, 2008, although states may request an extension of up to 2 additional years.

In addition, states that choose to incorporate the following provisions must describe how they will implement them in their primacy applications (see Chapter 4, section 4.4):

- \$ Approve an alternative to the *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people.
- \$ Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.

- \$ Approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.
- \$ Approve protocols for treatment credits under the demonstration of performance toolbox option and for alternative ozone and chlorine dioxide CT values.
- \$ Approve an alternative approach to UV reactor validation testing in the microbial toolbox.

### **1.3.2 State Recordkeeping Requirements [40 CFR 142.14]**

The current regulations in §142.14 require states with primacy to keep various records including analytical results to determine compliance with MCLs, MRDLs, and TT requirements; system inventories; state approvals; enforcement actions; and variance and exemption status. The LT2ESWTR requires that the state keep records related to any decisions made pursuant to the requirements in §141.700B§141.724. In addition, states must keep records of:

- \$ Results of source water *E. coli* and *Cryptosporidium* monitoring.
- \$ The bin classification after the initial and after the second round of source water monitoring.
- \$ Any changes in treatment requirements for filtered systems due to watershed assessment during sanitary surveys.
- \$ Determination of whether each unfiltered system has a mean source water *Cryptosporidium* level above 0.01 oocysts/L after the initial and the second round of source water monitoring.
- \$ The treatment processes or control measures that each system employs to meet *Cryptosporidium* treatment requirements under the LT2ESWTR.
- \$ A list of systems required to cover or treat the effluent of an uncovered finished water storage facility.

### **1.3.3 State Reporting Requirements [40 CFR 142.15]**

The current regulations in §142.15 require states to report certain information to EPA, including:

- \$ Bin classification after the initial and second round of source water monitoring.
- \$ Changes in treatment requirements as a result of a watershed assessment during sanitary surveys.
- \$ Determination of whether the mean *Cryptosporidium* level is greater than 0.01 oocysts/L after initial and second round of source water monitoring for unfiltered systems.

## 1.4 Summary of Action Dates

### 1.4.1 Applicability and Compliance Dates

The LT2ESWTR applies to systems using surface or GWUDI as a source and focuses on source water conditions and the appropriate level of treatment [§141.700]. Table 1-18 summarizes key compliance dates required (in **bold**) by the LT2ESWTR, as well as suggested action dates. Systems must comply with treatment requirements based on their specific risk characterizations, as determined through source water monitoring. The compliance dates are designed to allow systems to comply simultaneously with the Stage 2 DBPR and the LT2ESWTR in order to balance risks associated with DBPs with risks associated with microbial pathogens.

Note the term “state” or “states” is used in the following and is used to refer to all types of primacy agencies including U.S. territories, Indian tribes, and EPA Regions.

**Table 1-18. Summary of Action Dates for the LT2ESWTR**

<b>Date</b>	<b>LT2ESWTR Action</b>
January 5, 2006	Final rule is published in <i>Federal Register</i> .
<b>STATES</b>	
January 5, 2006	States should begin determining how they will assess significant changes in the watershed and source water as part of the sanitary survey process and appropriate follow-up actions.
January 5, 2006	States should begin determining how they will approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.
January 5, 2006	States should begin specifying any alternative <i>E. coli</i> indicator values for small systems.
January 5, 2006	States should begin determining how they will approve protocols for treatment credits under the demonstration of performance toolbox option, for alternative ozone and chlorine dioxide CT values, and for UV reactor validation testing.
January 5, 2006	States should begin awarding <i>Cryptosporidium</i> treatment credit for primary treatments in place.
January 5, 2006	States are encouraged to communicate with affected systems regarding LT2ESWTR requirements.
December 1, 2006	States are encouraged to review grandfathered data for Schedule 1 systems as soon as possible.
April 1, 2007	States are encouraged to update their data management systems.
June 1, 2007	States are encouraged to review grandfathered data for Schedule 2 systems as soon as possible.
June 1, 2008	States are encouraged to review grandfathered data for Schedule 3 systems as soon as possible.
April 1, 2009	States should oversee large system bin assignments.
December 1, 2008	States are encouraged to review grandfathered data for Schedule 4 filtered systems as soon as possible.
June 1, 2010	States are encouraged to review grandfathered data for Schedule 4 unfiltered systems as soon as possible.

Date	LT2ESWTR Action
October 1, 2012	States should oversee small system bin assignments.
April 1, 2013	States should award <i>Cryptosporidium</i> treatment credit to large systems for toolbox option implementation.
October 1, 2015	States should award <i>Cryptosporidium</i> treatment credit to small systems for toolbox option implementation.
<b>SCHEDULE 1 SYSTEMS</b>	
<b>July 1, 2006</b>	<b>Systems on Schedule 1 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]</b>
<b>July 1, 2006</b>	<b>Systems on Schedule 1 must notify EPA (or the state if the state wishes to have systems report to them) of their intent to submit results for grandfathering data. [§141.707]</b>
<b>October 1, 2006</b>	<b>Systems on Schedule 1 must begin initial source water monitoring. [§141.701(b)]</b>
<b>December 1, 2006</b>	<b>Systems on Schedule 1 must submit monitoring results for grandfathering. [§141.707]</b> (States are encouraged to review grandfathered data as soon as possible.)
<b>April 1, 2009</b>	<b>Filtered systems on Schedule 1 must report their initial bin classification to the state for approval. [§141.710(e)(1)]</b>
<b>April 1, 2009</b>	<b>Unfiltered systems on Schedule 1 must report the mean of all initial round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(1)]</b>
<b>April 1, 2012</b>	<b>Based on first round of source water monitoring, Systems on Schedule 1 must meet any additional <i>Cryptosporidium</i> treatment requirements.<sup>1</sup> [§141.713(c)]</b>
<b>January 1, 2015</b>	<b>Systems on Schedule 1 must submit to the state their sampling locations and sampling schedule for the second round of source water monitoring. [§141.702(a)]</b>
<b>April 1, 2015</b>	<b>Systems on Schedule 1 must begin second round of source water monitoring. [§141.701(b)]</b>
<b>October 1, 2017</b>	<b>Filtered systems on Schedule 1 must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(2)]</b>
<b>October 1, 2017</b>	<b>Unfiltered systems on Schedule 1 must report the mean of all second round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(2)]</b>
<b>SCHEDULE 2 SYSTEMS</b>	
<b>January 1, 2007</b>	<b>Systems on Schedule 2 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]</b>
<b>January 1, 2007</b>	<b>Systems on Schedule 2 must notify EPA (or the state if the state wishes to have systems report to them) of their intent to submit results for grandfathering data. [§141.707]</b>
<b>April 1, 2007</b>	<b>Systems on Schedule 2 must begin initial source water monitoring. [§141.701(b)]</b>
<b>June 1, 2007</b>	<b>Systems on Schedule 2 must submit monitoring results for grandfathering. [§141.707]</b> (States are encouraged to review grandfathered data as soon as possible.)
<b>October 1, 2009</b>	<b>Filtered systems on Schedule 2 must report their initial bin classification to the state for approval. [§141.710(e)(1)]</b>

Date	LT2ESWTR Action
October 1, 2009	Unfiltered systems on Schedule 2 must report the mean of all initial round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(1)]
October 1, 2012	Based on first round of source water monitoring, Systems on Schedule 2 must meet any additional <i>Cryptosporidium</i> treatment requirements. <sup>1</sup> [§141.713(c)]
July 1, 2015	Systems on Schedule 2 must submit to the state their sampling locations and sampling schedule for the second round of source water monitoring to the state. [§141.702(a)]
October 1, 2015	Systems on Schedule 2 must begin second round of source water monitoring. [§141.701(b)]
April 1, 2018	Filtered systems on Schedule 2 must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(2)]
April 1, 2018	Unfiltered systems on Schedule 2 must report the mean of all second round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(2)]
<b>SCHEDULE 3 SYSTEMS</b>	
January 1, 2008	Systems on Schedule 3 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]
January 1, 2008	Systems on Schedule 3 must notify EPA (or the state if the state wishes to have systems report to them) of their intent to submit results for grandfathering data. [§141.707]
April 1, 2008	Systems on Schedule 3 must begin initial source water monitoring. [§141.701(b)]
June 1, 2008	Systems on Schedule 3 must submit monitoring results for grandfathering. [§141.707] (States are encouraged to review grandfathered data as soon as possible.)
October 1, 2010	Filtered systems on Schedule 3 must report their initial bin classification to the state for approval. [§141.710(e)(1)]
October 1, 2010	Unfiltered systems on Schedule 3 must report the mean of all initial round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(1)]
October 1, 2013	Based on first round of source water monitoring, Systems on Schedule 3 must meet any additional <i>Cryptosporidium</i> treatment requirements. <sup>1</sup> [§141.713(c)]
July 1, 2016	Systems on Schedule 3 must submit to the state their sampling locations and sampling schedule for the second round of source water monitoring to the state. [§141.702(a)]
October 1, 2016	Systems on Schedule 3 must begin second round of source water monitoring. [§141.701(b)]
April 1, 2019	Filtered systems on Schedule 3 must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(2)]
April 1, 2019	Unfiltered systems on Schedule 3 must report the mean of all second round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(2)]

Date	LT2ESWTR Action
<b>SCHEDULE 4 SYSTEMS (<i>E. coli</i> monitoring only)</b>	
July 1, 2008	Filtered systems on Schedule 4 must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]
July 1, 2008	Filtered systems on Schedule 4 must notify the state of their intent to submit results for grandfathering data. [§141.707]
October 1, 2008	Filtered systems on Schedule 4 that monitor for <i>E. coli</i> must begin source water monitoring. [§141.701(b)]
December 1, 2008	Filtered systems on Schedule 4 must submit monitoring results for grandfathering. [§141.707] (States are encouraged to review grandfathered data as soon as possible.)
July 1, 2017	Filtered systems on Schedule 4 must submit to the state their sampling locations and sampling schedule for the second round of <i>E. coli</i> monitoring to the state. [§141.702(a)]
October 1, 2017	Filtered systems on Schedule 4 that monitor for <i>E. coli</i> must begin second round of source water monitoring. [§141.701(b)]
<b>SCHEDULE 4 SYSTEMS (<i>Cryptosporidium</i> monitoring and Unfiltered Systems)</b>	
January 1, 2010	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> and unfiltered systems must submit to the state their sampling locations and sampling schedule that specifies the dates of sample collection for initial source water monitoring. [§141.702(a)]
January 1, 2010	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> and unfiltered systems must notify the state of their intent to submit results for grandfathering data. [§141.707]
April 1, 2010	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> and unfiltered systems must begin initial source water monitoring. [§141.701(b)]
June 1, 2010	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> and unfiltered systems must submit monitoring results for grandfathering. [§141.707] (States are encouraged to review grandfathered data as soon as possible.)
October 1, 2011 or October 1, 2012	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> must report their initial bin classification to the state for approval. [§141.710(e)(1)]
October 1, 2011 or October 1, 2012	Unfiltered systems on Schedule 4 must report the mean of all initial round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(1)]
October 1, 2014	Based on first round of source water monitoring, systems on Schedule 4 must meet any additional <i>Cryptosporidium</i> treatment requirements. <sup>1</sup> [§141.713(c)]
January 1, 2019	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> and unfiltered systems must submit to the state their sampling locations and sampling schedule for the second round of <i>Cryptosporidium</i> monitoring to the state. [§141.702(a)]
April 1, 2019	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> and unfiltered systems must begin second round of source water monitoring. [§141.701(b)]
October 1, 2021 or October 1, 2020	Filtered systems on Schedule 4 that monitor for <i>Cryptosporidium</i> must report their bin classification after the second round of monitoring to the state for approval. [§141.710(e)(1)]

Date	LT2ESWTR Action
October 1, 2021 or October 1, 2020	Unfiltered systems on Schedule 4 must report the mean of all second round <i>Cryptosporidium</i> sample results to the state. [§141.712(a)(1)]
<b>UNCOVERED RESERVOIRS</b>	
April 1, 2008	Systems must notify the state of all uncovered treated water storage facilities. [§141.714(b)]
April 1, 2009	Uncovered finished water storage facilities must be covered, or the water must be treated before entry into the distribution system. [§141.714(c)]

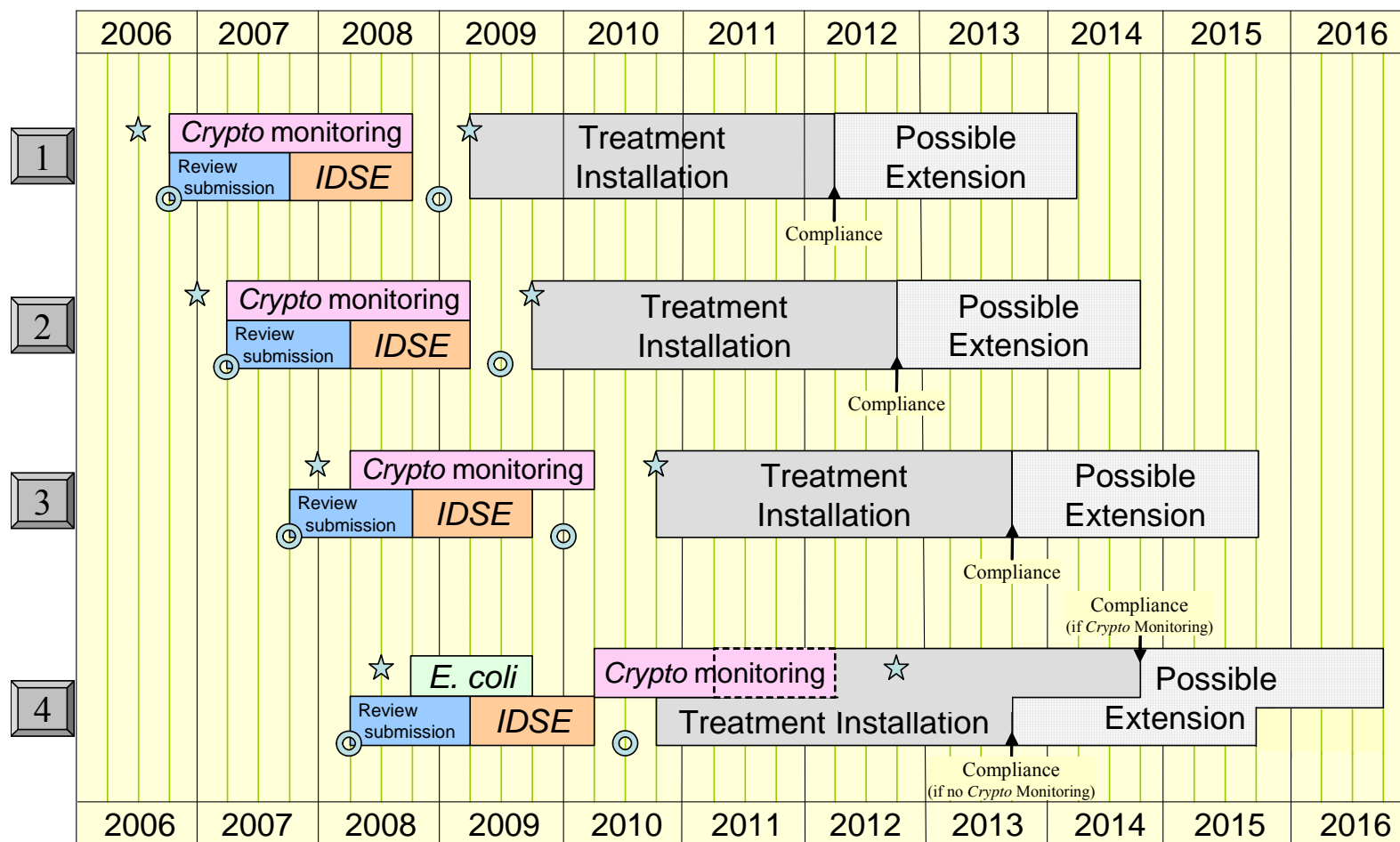
1. The state may grant 2-year extensions for capital improvements. See Appendix H for guidance on reviewing extension requests under Section 1412(b)(10) of the SDWA.

Note: Wholesale systems must follow the schedule based on the population of the largest system in their combined distribution system.

#### 1.4.2 Timeline for the LT2ESWTR

Figure 1-2 depicts the LT2ESWTR requirements and implementation timeline for states and systems for the four schedules (based on population served by systems).

Figure 1-2. Implementation Timeline for the LT2ESWTR



★ LT2 Plan or bin classification due

○ Stage 2 IDSE Plan or report due

*Includes associated consecutive systems*

Notes:

1. For small systems, the second round requirements are the same as the first with respect to monitoring for *E. coli* (or an indicator) and monitoring for *Cryptosporidium* is only required if *E. coli* or indicator triggers are exceeded.
2. Unfiltered systems must monitor for *Cryptosporidium*, regardless of size.



## References

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## **Section 2**

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# **Resources and Guidance**

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In addition to this Implementation Guidance, a variety of resource materials and technical guidance documents have been prepared by EPA to facilitate understanding and implementing the LT2ESWTR. This section is an overview of each of these resources and includes instructions on how to obtain the documents.

## 2.1 Technical Guidance Manuals

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EPA is developing technical guidance manuals to support the LT2ESWTR. These manuals will aid EPA, state agencies, and affected PWSs in implementing this rule and will help ensure that implementation among these groups is consistent.

- \$ The *Source Water Monitoring Guidance for Public Water Systems* (EPA 815-R-06-005, February 2006) provides guidance on activities related to *Cryptosporidium* and *E. coli* monitoring under the LT2ESWTR, such as laboratory contracting, sample collection procedures, and data evaluation and interpretation.
- \$ The *Microbial Laboratory Manual for the LT2ESWTR* (EPA 815-R-06-006, February 2006) provides guidance to laboratories on procedures for analyzing *Cryptosporidium* and *E. coli* samples under the LT2ESWTR to ensure compliance and maximize data quality and consistency.
- \$ The *Ultraviolet Disinfection Guidance Manual* (EPA 815-R-06-007, November 2006) provides guidance on the validation, selection, design, and operation of UV disinfection systems to comply with treatment requirements under the Rule.
- \$ The *Membrane Filtration Guidance Manual* (EPA 815-R-06-009, November 2005) provides guidance on the selection, design, and operation of membrane filtration to comply with treatment requirements under the Rule.
- \$ The *LT2ESWTR Toolbox Guidance Manual* (publication to be announced later) provides guidance on the selection, design, and operation of treatment and management strategies in the LT2ESWTR “microbial toolbox” to comply with treatment requirements under the Rule.
- \$ The *Guidance on Generation and Submission of Grandfathered *Cryptosporidium* Data for Bin Classification Under the LT2ESWTR* (publication to be announced later) provides guidance to PWSs that elect to monitor for *Cryptosporidium* prior to their compliance dates required by LT2ESWTR. The guidance describes how PWSs can perform grandfathered *Cryptosporidium* monitoring such that the results should be equivalent to data generated under the LT2ESWTR and, therefore, acceptable for use in bin classification.

- \$ The *Simultaneous Compliance Manual for Long Term 2 and Stage 2 DBP Rules* (EPA 817-D-06-003) describes the various potential treatment and operational conflicts that may arise as systems comply with these two rules in addition to other existing rules.
- \$ The *Small Entity Compliance Guidance Manual* (publication to be announced later) is intended for small PWSs, as required by the Small Business Regulatory Enforcement Fairness Act of 1996. This guide contains a general introduction and background for the LT2ESWTR, describes the specific requirements of the LT2ESWTR, and provides information on how to comply with those requirements.

**For more information**, contact EPA's Safe Drinking Water Hotline, (800) 426-4791 or see the Office of Ground Water and Drinking Water (OGWDW) Web page. The Rule and guidance documents are located at ([www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2)).

## 2.2 Rule Presentation

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Presentations that may be useful for workshops on the LT2ESWTR will be available in PowerPoint format on EPA's Web site: [www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2).

## 2.3 Fact Sheet/Quick Reference Guide

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A Fact Sheet/Quick Reference Guide for the LT2ESWTR may be useful in conveying basic information to water systems, new personnel, and for educating stakeholders about the Rule. The following are stand-alone documents and are included in Appendix C of this guidance:

- ✓ Fact Sheet: Long Term 2 Enhanced Surface Water Treatment Rule.
- ✓ LT2ESWTR Source Water Monitoring for Systems Serving At Least 10,000 People.
- ✓ LT2ESWTR Source Water Monitoring for Systems Serving Less Than 10,000 People.
- ✓ LT2ESWTR Data Collection and Tracking System.
- ✓ LT2ESWTR Laboratory Fact Sheet.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 1 Systems.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 2 Systems.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 3 Systems.
- ✓ Long Term 2 Enhanced Surface Water Treatment Rule: A Quick Reference Guide For Schedule 4 Systems.

- ✓ List of Laboratories Approved for the Analysis of *Cryptosporidium* under the SDWA.
- ✓ LT2 Rule: *Cryptosporidium* & *E. coli* Sample Collection Recommendations Pocket Guide.

## 2.4 Frequently Asked Questions

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Questions and Answers (Q&As) on the LT2ESWTR are provided in this section. These questions have been asked of EPA through the Safe Drinking Water Hotline, implementation training, and/or other means.

### *Schedule*

**Q1: What are the population ranges of the four schedules?**

**A1:** The population ranges of the four schedules are:

<i>If you have a Subpart H source and are this kind of system:</i>	<i>You are on schedule number:</i>
System serving 100,000 or more people OR a wholesale system in a combined distribution system that contains a system serving 100,000 or more people	1
System serving 50,000 to 99,999 people OR a wholesale system in a combined distribution system with the largest system serving 50,000 to 99,999	2
System serving 10,000 to 49,999 people OR a wholesale system in a combined distribution system with the largest system serving 10,000 to 49,999	3
System serving fewer than 10,000 people	4

**Q2: Should a system adjust its source water monitoring schedule if its population increases or decreases during initial monitoring so much that the system is moved into a different schedule?**

**A2:** It is important for systems to conduct at least 24 consecutive months of monitoring. If a system's population changes so much that the system is shifted into a different schedule, the system should remain on its original schedule for the duration of initial monitoring.

**Q3: How will the LT2ESWTR affect new water systems? What should a new system do if it does not have 2 years of source water data prior to installing treatment?**

**A3:** New systems should work with the primacy agency to determine applicable compliance dates. The LT2ESWTR does not require systems to have 2 years of data if they have sufficient treatment in place to achieve 5.5-log of treatment (if a filtered system) or 3.0-log inactivation (if an unfiltered system).

### *Combined Distribution Systems*

**Q4: How does a wholesale system differ from a purchased system?**

**A4:** A wholesale system is a PWS that treats source water to produce finished water and sells that water to another PWS. A purchased system buys finished water from a wholesale system.

**Q5: What is a combined distribution system?**

**A5:** A combined distribution system is the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

**Q6: How should a system in a combined distribution system determine its schedule?**

**A6:**

<i>If your system:</i>	<i>You must comply with the schedule and monitoring requirements of:</i>
Sells finished water and has its own Subpart H source	The largest system in your combined distribution system
Sells finished water but does not have its own Subpart H source	The largest system in your combined distribution system*
Does not sell finished water but has its own Subpart H source	The population of your own system
Does not sell finished water and does not have its own Subpart H source	The population of your own system*

*\*It is important to note that systems with no Subpart H source in a combined distribution system are not required to conduct source water monitoring; however, they must comply with other requirements of the LT2ESWTR (i.e., covering finished water reservoirs or treating the discharge and complying with disinfection profiling and benchmarking requirements).*

The summed population of all the systems in the combined distribution system is not used to determine compliance schedule.

**Q7: If a wholesale system serving fewer than 10,000 people has its own Subpart H source and purchases finished water from a Schedule 1 system, can the small system still conduct *E. coli* trigger level monitoring, or is the small system required to conduct *Cryptosporidium*, *E. coli*, and turbidity monitoring?**

**A7:** Systems in a combined distribution system that have their own Subpart H source and sell finished water are required to monitor for the same contaminants as required of the largest system in the combined distribution system. The small system in this example both purchases and sells finished water and has its own Subpart H source; therefore it will be required to meet the monitoring requirements of the Schedule 1 system. The small system would not have the option of conducting only triggered *E. coli* monitoring; it would be required to monitor for *Cryptosporidium*, *E. coli*, and turbidity. Wholesale systems, regardless of size, must comply with the schedule and monitoring requirements of the largest system in their combined distribution system.



**Q8: If a purchased system boosts its disinfectant level but does not otherwise treat purchased water, would this system be considered a consecutive system or, due to the addition of disinfectant, would this system be considered wholesale system?**

**A8:** There are four possibilities for this system:

<i>If the purchased system:</i>	<i>The system is:</i>	<i>And would be on:</i>
Does not have its own Subpart H source but does sell finished water	Consecutive	The schedule of the largest system in the combined distribution system
Has its own Subpart H source and sells finished water	Wholesale	The schedule of the largest system in the combined distribution system
Does not sell finished water and does not have its own Subpart H source	Consecutive	The schedule of its own population class
Does not sell finished water but does have its own Subpart H source	Consecutive	The schedule of its own population class

**Q9: What is the definition of “interconnection”? If a system purchases water from a wholesale system and also treats and distributes its own water from a Subpart H source, is it considered an interconnected system?**

**A9:** Interconnection is defined as “the state of being connected.” In terms of PWSs, if two systems are connected to each other, then they are interconnected. Yes, the system described in this question would be considered interconnected (i.e., part of a combined distribution system, a consecutive system). If this system sells finished water to another system, it must follow the compliance schedule of the largest system in the combined distribution system. If this system does not sell finished water to another system, it would follow the compliance schedule of its own population class (see Q8).

#### *Removal/Inactivation Requirements*

**Q10: What is log turbidity removal?**

**A10:** Log turbidity removal is a base 10 log value based on the influent and effluent turbidity concentrations. For example, a 0.5-log reduction corresponds to a 68 percent reduction in turbidity (influent turbidity is equal to 100 and effluent turbidity is equal to 32):

$$0.5\text{-log} = \log (100/32)$$

Log removal values are used because they can be determined for each treatment unit in a treatment train. Then the individual values can be added to obtain a total log removal for the treatment train.

**Q11: When providing maximum treatment instead of conducting source water monitoring, why must filtered systems provide 5.5-log *Cryptosporidium* removal/inactivation while unfiltered systems must only supply 3.0-log inactivation?**

**A11:** Filtered systems must provide 5.5-log *Cryptosporidium* removal/inactivation to avoid source water monitoring because they most likely do not have the same high quality source water as unfiltered systems. Unfiltered systems must only provide 3.0-log inactivation to avoid source water monitoring because these systems have higher quality source water and are able to meet the filtration avoidance criteria in 40 CFR 141.71.

**Q12: Depending on their source water *Cryptosporidium* concentration, unfiltered systems must provide at least 2.0-log or 3.0-log inactivation. Can this protection be provided by one disinfection method or must it come from a combination of treatment?**

**A12:** Systems must use at least two disinfectants to meet the combined *Cryptosporidium*, *Giardia lamblia*, and virus inactivation requirements. One disinfectant must be chlorine dioxide, ozone, or ultraviolet (UV) light. *Cryptosporidium* inactivation can be accomplished by any one of these three disinfection methods. For example, using free chlorine to meet virus and *Giardia* inactivation requirements and using UV light to provide 2.0-log *Cryptosporidium* inactivation is sufficient.

**Q13: Currently, conventional treatment plants receive a 2.0-log treatment credit for *Cryptosporidium*. Under the LT2ESWTR, the base removal/inactivation requirement will change to 3.0-log. Will systems in Bin 1 be required to provide an extra 1.0-log of treatment?**

**A13:** Under the LT1ESWTR and the IESWTR, conventional treatment plants receive a 2.0-log reduction credit for *Cryptosporidium*. Subsequent to the promulgation of these rules, EPA has come to believe that conventional treatment plants operating under the conditions of the LT1ESWTR and the IESWTR are capable of providing 3.0-log *Cryptosporidium* removal. Under the LT2ESWTR, conventional treatment plants will receive a 3.0-log *Cryptosporidium* removal credit. Systems in Bin 1 will not be required to provide any additional treatment.

#### *Grandfathering*

**Q14: What criteria must grandfathered data meet to be allowable under the LT2ESWTR?**

**A14:** Grandfathered data must meet the following criteria to be allowable under the LT2ESWTR:

\$ Data must have been analyzed using approved laboratory methods.

\$ For each *Cryptosporidium* sample, the laboratory must have analyzed at least 10 L of sample or at least 2 mL of packed pellet volume.

\$ Sampling locations must meet the conditions of 40 CFR 141.703.

\$ Samples must have been collected no earlier than January 1999.

States also have discretion in approving or rejecting data submitted for grandfathering.

**Q15: If a system wishes to grandfather *Cryptosporidium* source water data, does this data have to include *E. coli* and turbidity data as well, or is *Cryptosporidium* data alone sufficient? How much data needs to be grandfathered?**

**A15:** If a system submitting *Cryptosporidium* data for grandfathering has *E. coli* and turbidity data available, these data should be submitted as well. If a system does not have *E. coli* and turbidity data, it can still submit *Cryptosporidium* data for grandfathering. A system can grandfather as much data as it has, as long as it meets the grandfathering requirements.

**Q16: Can systems delay source water monitoring if they have submitted grandfathered data for approval?**

**A16:** EPA anticipates there will be some variability in the amount of source water data systems will submit for grandfathering – some systems will have several sequential months of data, others will have focused their monitoring during a limited time of year, such as during just the fall or spring, and others will have most of the data they need with some data gaps. 40 CFR 141.701(h)

specifies that grandfathered data may substitute an equivalent number of months at the end of the monitoring period. Therefore, systems with sequential months of grandfathered data would begin source water monitoring according to the schedule in the LT2 rule, and could stop monitoring during the months represented by their grandfathered data. Similarly, 40 CFR 141.707(e)(1) indicates a system may only need to monitor to fill-in gaps in the grandfathered data. In this scenario, a system may not need to begin monitoring on the start date specified in the rule if they have adequate grandfathered data representative of that calendar month.

**Q17: If a system has submitted a request to grandfather previously collected data but they have not heard whether their request is approved, must they begin source water monitoring on the date required by the LT2ESWTR?**

**A17:** If a system's previously collected data meets all of the requirements for grandfathering data and would be representative of source water quality at the time the source water samples would be collected, the system would not need to begin monitoring. However, if the state subsequently rejects some of the data submitted for grandfathering, the system must begin additional monitoring 2 months after being notified of the inadequate samples and in accordance with a state-approved schedule.

#### *Source Water Monitoring*

**Q18: Are systems required to conduct source water monitoring on a specific date, such as the 5th of each month, or can systems choose a flexible date, such as the first Monday of each month to collect their samples? How should systems handle weekend sampling (particularly for *E. coli* monitoring when the maximum sample holding time is 30 hours)?**

**A18:** Systems can monitor on a specific date or on a flexible date as long as samples are taken at approximately the same time every month. Systems should work with labs to coordinate sampling schedules and to avoid sampling on weekends and holidays.

**Q19: How can a system that switches between sources seasonally sample in a way that fulfills the LT2ESWTR requirements? Can the system subsequently change the way it switches between the two sources, or will the system be locked into using the sources exactly as they were used during initial monitoring?**

**A19:** The system should follow standard operating procedures and sample from whichever source is in use on the scheduled day of sampling. As long as the system follows these requirements, it can later change the way it uses those sources.

**Q20: When creating a composite source water sample from multiple sources, assuming a blended tap is not available, what volumes must be collected from each source? Also, what should the total composite sample volume be?**

**A20:** When creating a composite sample, the system should collect the volume contributed from each source based on the proportion of flow that the sources contributed to the plant on the day of the sampling (e.g., if Source A contributed 75 percent of flow to the plant on the day of sampling and Source B contributed 25 percent of flow, the composite sample would be 75 percent from Source A and 25 percent from Source B). The composite sample should represent the stream being treated by the plant. The total sample volume for a composite sample is the same as for any sample: 10 L sample volume or 2 mL packed pellet volume.

**Q21: What is an example of an acceptable reason for not collecting a source water sample within 2 days of the scheduled sampling date? Are problems in the distribution system or high turbidity events acceptable reasons for missing a source water sampling date?**

**A21:** Issues with the source such as a very large rain event that poses danger to the sample collector are acceptable reasons for missing a source water monitoring deadline. Also, weather conditions, such as ice, that prevent access to the intake justify missing a source water monitoring deadline. A high turbidity event alone would not justify missing a source water monitoring deadline, and neither would issues in the distribution system. The primacy agency has additional discretion in determining acceptable justifications for missing samples.

**Q22: If a system misses their January source water sample, can the system replace the sample in the following months or must the system wait until the following January to replace the sample?**

**A22:** These situations must be handled on a case-by-case basis by the primacy agency. If the system can take a replacement sample that will be representative of the seasonal conditions of the omitted month, it may be possible to replace the sample. The Information Processing and Management Center (IPMC) and the LT2ESWTR data collection system will help systems and states identify source water samples that have been missed; if systems are notified early enough they can collect a replacement sample before seasonal conditions change.

**Q23: If a system commits to providing treatment instead of conducting source water monitoring, can they later decide to conduct source water monitoring?**

**A23:** Systems may decide to conduct source water monitoring before the applicable source water monitoring deadline has passed. However, after the deadline has passed, it may be difficult for the system to meet subsequent deadlines. Therefore a system must be very confident that it will be able to meet future deadlines before retracting its intent to treat notice and beginning source water monitoring.

**Q24: Where would a system that uses a presedimentation basin without coagulant collect source water samples? If this system began to use coagulant after the first round of monitoring, where would it collect its second round samples?**

**A24:** This system would collect first round samples after the presedimentation basin (as long as no coagulant is used). If the system starts to add coagulant to meet bin requirements, it would be required to collect samples before the presedimentation basin for second round monitoring.

#### *Toolbox Options*

**Q25: If a system meets both the CFE and the IFE criteria, can the system receive *Cryptosporidium* treatment credit for both treatment options?**

**A25:** Yes, systems meeting both CFE and IFE requirements may receive a 0.5-log *Cryptosporidium* treatment credit for each treatment, for a total of 1.0-log treatment credit.

**Q26: If a system receiving the 0.5-log CFE turbidity toolbox credit exceeds 0.15 NTU more than 5 percent of the time, is there a grace period for the system to return to compliance without losing treatment credit?**

**A26:** No, there is no grace period. The system would be out of compliance for the month when the exceedance occurred. The system would receive a TT violation and have to comply with public notification requirements. It would be up to the primacy agency to determine if the system would be allowed to continue receiving treatment credit for that toolbox option.

- Q27: Are combined filter performance and individual filter performance standards based on measurements taken every 4 hours?**
- A27:** No. Combined filter performance standards are based on measurements taken every 4 hours, but individual filter performance standards are based on measurements taken every 15 minutes as required by the IESWTR and the LT1ESWTR.
- Q28: If a single process (e.g., UV light) is conducted in series, can a system receive additional *Cryptosporidium* log removal credit?**
- A28:** Yes, systems can add processes together for additional *Cryptosporidium* treatment credit.

#### *Laboratories*

- Q29: Is there a list of monitoring laboratories certified to analyze *Cryptosporidium*?**
- A29:** A list of approved labs can be found at [www.epa.gov/safewater/disinfection/lt2/lab\\_aprvlabs.html](http://www.epa.gov/safewater/disinfection/lt2/lab_aprvlabs.html).
- Q30: How will labs be trained to use the Stage 2/LT2ESWTR database?**
- A30:** Labs will be trained to use the database as part of the lab certification program.
- Q31: Do labs need to report sample results to the systems? Is this required by the LT2ESWTR?**
- A31:** The LT2ESWTR requires that systems report monitoring results, and that systems serving 10,000 people or more submit results electronically, unless the primacy agency specifies otherwise.

#### *Information Collecting and Reporting*

- Q32: Will the Data Collecting and Tracking System (DCTS) migrate violations to Safe Drinking Water Information System/Federal (SDWIS/Fed) or will states need to download violations manually?**
- A32:** EPA received feedback from most states expressing interest in the ability to migrate violations and is working on this functionality.
- Q33: Can states request that systems send reports to the state directly?**
- A33:** States can require direct reporting for systems. EPA believes that states will not immediately have primacy and that, until then, reports will come to the state through the IPMC.

#### *Support*

- Q34: Will systems be trained to use the Stage 2 DBPR and LT2ESWTR database?**
- A34:** Yes, there will be Web casts to train systems on the databases. Also, states and regions will receive a module on the database at train-the-trainer sessions, so that they can train their systems on how to use the databases.
- Q35: Will there be a guidance manual for the source water monitoring process? If so, when will it be available?**
- A35:** Yes, there is a source water monitoring guidance manual. It is available electronically at [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html) and can be requested in hard copy by contacting EPA (contact information is available on the Web site).

## *Violations*

**Q36: Does the LT2ESWTR include specific public notification requirements?**

**A36:** The LT2ESWTR requires public notification for a number of violations, but requires systems to provide special notice if they fail to collect three source water monitoring samples or if they miss the bin classification deadline.

**Q37: If a system fails to meet the required monthly IFE or CFE turbidity limits as described in §141.718(a) and §141.718(b), are additional requirements triggered beyond the PN requirements associated with a TT violation?**

**A37:** No, but the state has discretion to impose additional requirements if it feels that the system cannot meet the treatment requirements on a consistent basis.

**Q38: If a system receives a TT violation, is it required to use supplementary toolbox options to provide additional log removal credit to ensure that necessary protection is achieved?**

**A38:** If a system receives a TT violation, it can provide additional treatment or directly correct the problem that led to the TT violation. This is the same action recommended for a TT violation under the IESWTR and LT1ESWTR. If the state believes that the system will not be able to remedy the cause of the TT violation, a selection of additional toolbox treatment options may be warranted.

## *Other*

**Q39: If systems do not cover finished water storage facilities, what are the options? Is a risk mitigation plan still an option?**

**A39:** Systems that cannot cover finished water storage facilities can provide at least 4.0-log virus, 3.0-log *Giardia lamblia*, and 2.0-log *Cryptosporidium* removal/inactivation using a protocol approved by the state and still be in compliance with the LT2ESWTR. However, there is no longer a risk mitigation option.

## **Section 3**

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# **State Implementation**

EPA expects to undertake necessary rule implementation activities during the period of early implementation. During the early implementation period the state may elect to undertake some, or all, of the implementation activities, in cooperation with EPA. This will facilitate continuity of implementation and ensure that system-specific advice and decisions are made with the best available information and are consistent with existing state program requirements.



### 3.1 Overview of Implementation

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The LT2ESWTR applies to all systems using surface water and GWUDI. Requirements and compliance dates differ between system types (i.e., population served and existing treatment). Primacy agencies should clearly define monitoring, reporting, performance, and follow-up requirements to help systems understand how the Rule will affect them and what they must do to comply. The main implementation activities for primacy agencies include the following:

- \$ Address special primacy conditions.
- \$ Identify affected systems.
- \$ Communicate LT2ESWTR requirements to affected systems.
- \$ Update data management systems.
- \$ Approve laboratories for *Cryptosporidium* analysis.
- \$ Specify any alternative *E. coli* indicator values for small systems.
- \$ Oversee bin assignments.
- \$ Award *Cryptosporidium* treatment credit for treatments already in place (primary treatment).
- \$ Award *Cryptosporidium* treatment credit for implementation of options from the microbial toolbox.
- \$ Oversee disinfection profiling and benchmarking.

To help state implementation efforts, the guidance in this section and in section 4 makes suggestions and provides alternatives that go beyond the minimum primacy agency requirements specified in the subsections of §142.16. Such suggestions are prefaced by “may” or “should” and are to be considered advisory. They are not required elements of states’ applications for program revision.

### 3.2 Identify Special Primacy Conditions

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There are provisions of the LT2ESWTR that allow states discretion in establishing decision-making criteria. The special primacy requirements for the LT2ESWTR, which address the most important discretionary items, are discussed in section 4.4 of this guidance. Although that section describes how a state might satisfy the requirements and obtain primacy, states should inform the systems of their specific requirements with sufficient lead time to meet the compliance dates.

The main provisions for which states must make a timely decision regarding system requirements include the following:

- \$ States must establish criteria for approving watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox. To allow adequate time for

decision-making and planning, systems should be aware of state criteria for the watershed control program treatment credit 2 years before their treatment compliance date.

- \$ If states intend to allow an alternative to *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people, they must develop appropriate alternative criteria. Small systems should be aware of the alternative indicator, trigger values, and acceptable analytical methods prior to conducting monitoring, which begins as early as October 1, 2008.
- \$ States must establish protocols for awarding *Cryptosporidium* removal credits (both higher and lower) under the demonstration of performance toolbox option. At a minimum, systems will need to know the protocols in time to apply for demonstration of performance credit prior to the deadline for new treatment requirements (as early as April 1, 2012, for large systems). If a system's request for *Cryptosporidium* removal credits is not accepted by the state, the system could incur a TT violation if there is not enough time to implement another toolbox option.
- \$ If states intend to allow alternative disinfectant protocols, they must establish the alternative ozone and chlorine dioxide CT values and an alternative approach to UV reactor validation testing, as applicable. Systems should be aware of these alternative procedures before new treatment requirements go into effect (April 1, 2012).
- \$ Finally, states must establish criteria for assessing changes in the watershed and source water during the sanitary survey process.

### 3.3 Identify Affected Systems

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As mentioned previously, the LT2ESWTR applies to all systems that use surface water or GWUDI as a source. The subsections below summarize the four main provisions of the LT2ESWTR (i.e., source water monitoring, treatment, disinfection profiling and benchmarking, and uncovered finished reservoirs) as they apply to different system types. The Rule generally presents four compliance schedules, which are based on the population served by systems, as summarized in Table 3-1.

**Table 3-1. Compliance Schedules**

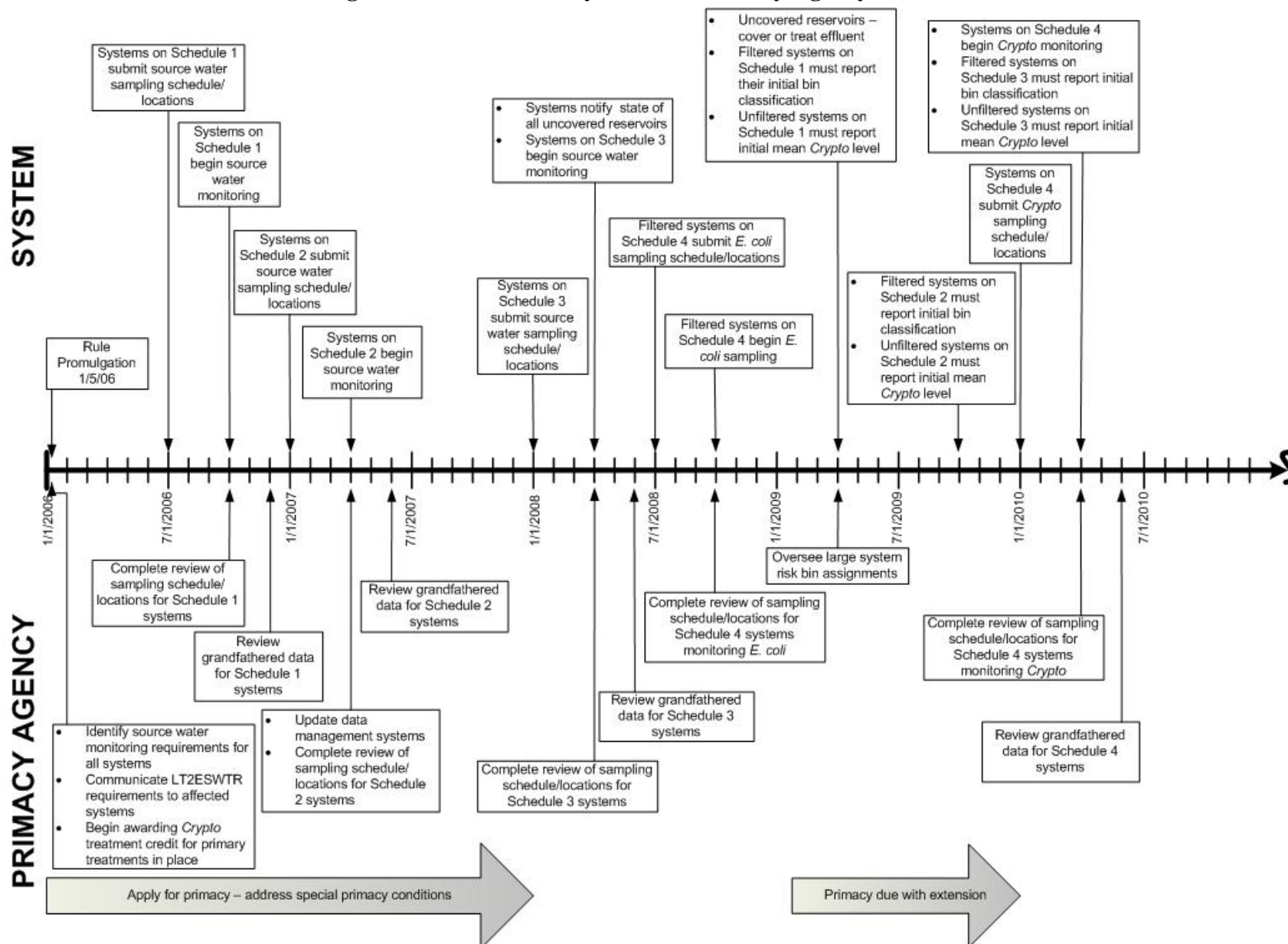
<i>If you have a Subpart H source and are this kind of system:</i>	<i>You are on schedule number:</i>
System serving 100,000 or more people OR a wholesale system in a combined distribution system that contains a system serving 100,000 or more people	1
System serving 50,000 to 99,999 people OR a wholesale system in a combined distribution system with the largest system serving 50,000 to 99,999	2
System serving 10,000 to 49,999 people OR a wholesale system in a combined distribution system with the largest system serving 10,000 to 49,999	3
System serving fewer than 10,000 people	4

Wholesale PWSs must comply with Stage 2 DBPR and LT2ESWTR requirements based on the population of the largest PWS in the combined distribution system. This approach will ensure that PWSs have the same compliance schedule under both the LT2ESWTR and Stage 2 DBPR. Although consecutive systems without their own source are not required to conduct source water monitoring, they do need to cover any uncovered reservoirs or treat the discharge, and meet disinfection profiling and benchmarking requirements.

The state has discretion with respect to new systems and sources, but these systems will be required to conduct source water monitoring unless they provide 5.5-log of treatment for *Cryptosporidium* (filtered systems) or 3.0-log treatment (unfiltered systems) using options from the toolbox. Therefore, new systems and systems with new sources must contact the state regarding their requirements and schedule for source water monitoring.

Figure 3-1 shows a timeline with system activities on the top and primacy agency activities on the bottom.

**Figure 3-1. Timeline of System and Primacy Agency Activities**



**Figure 3-1. Timeline of System and Primacy Agency Activities (cont.)**

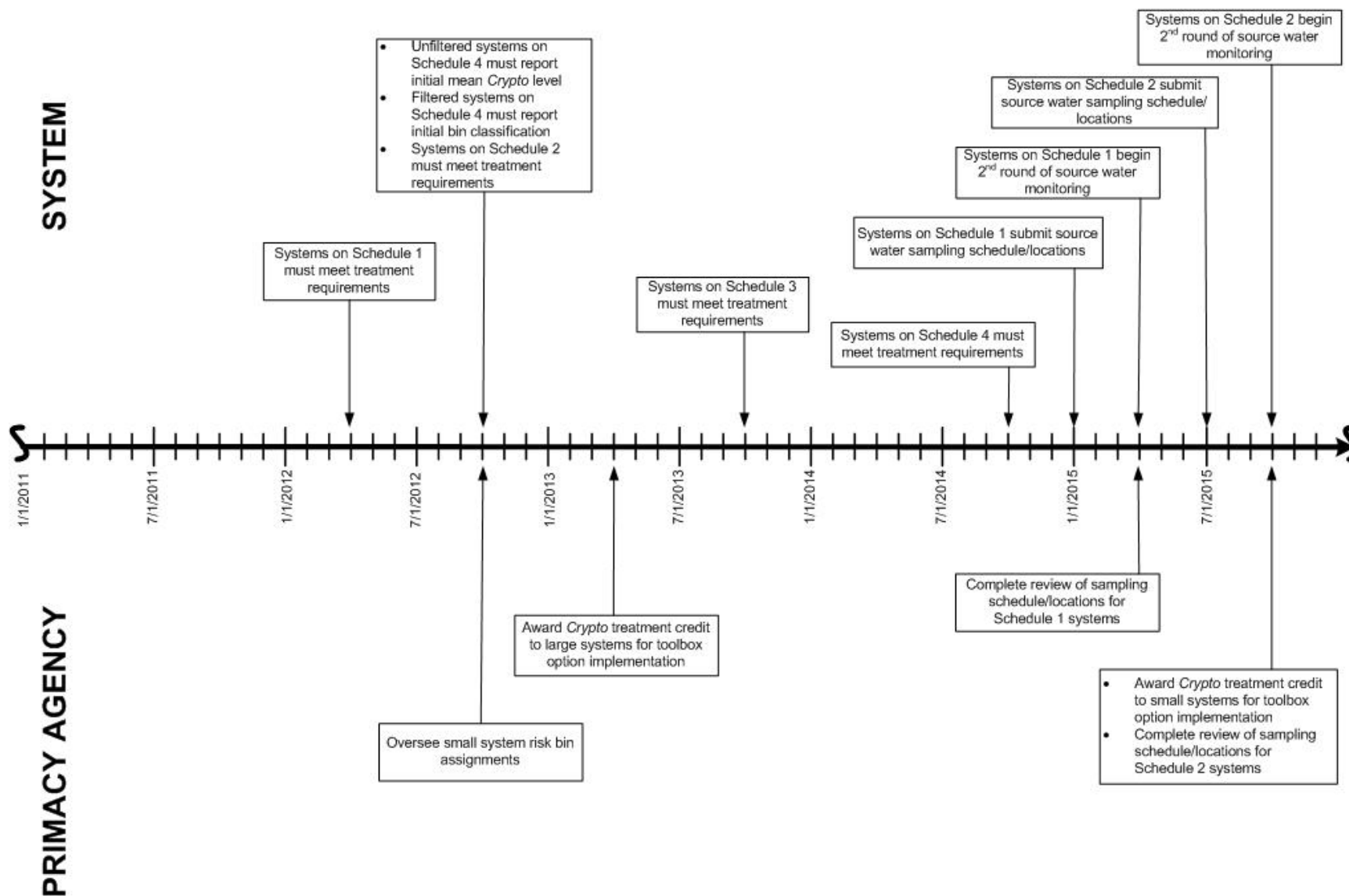
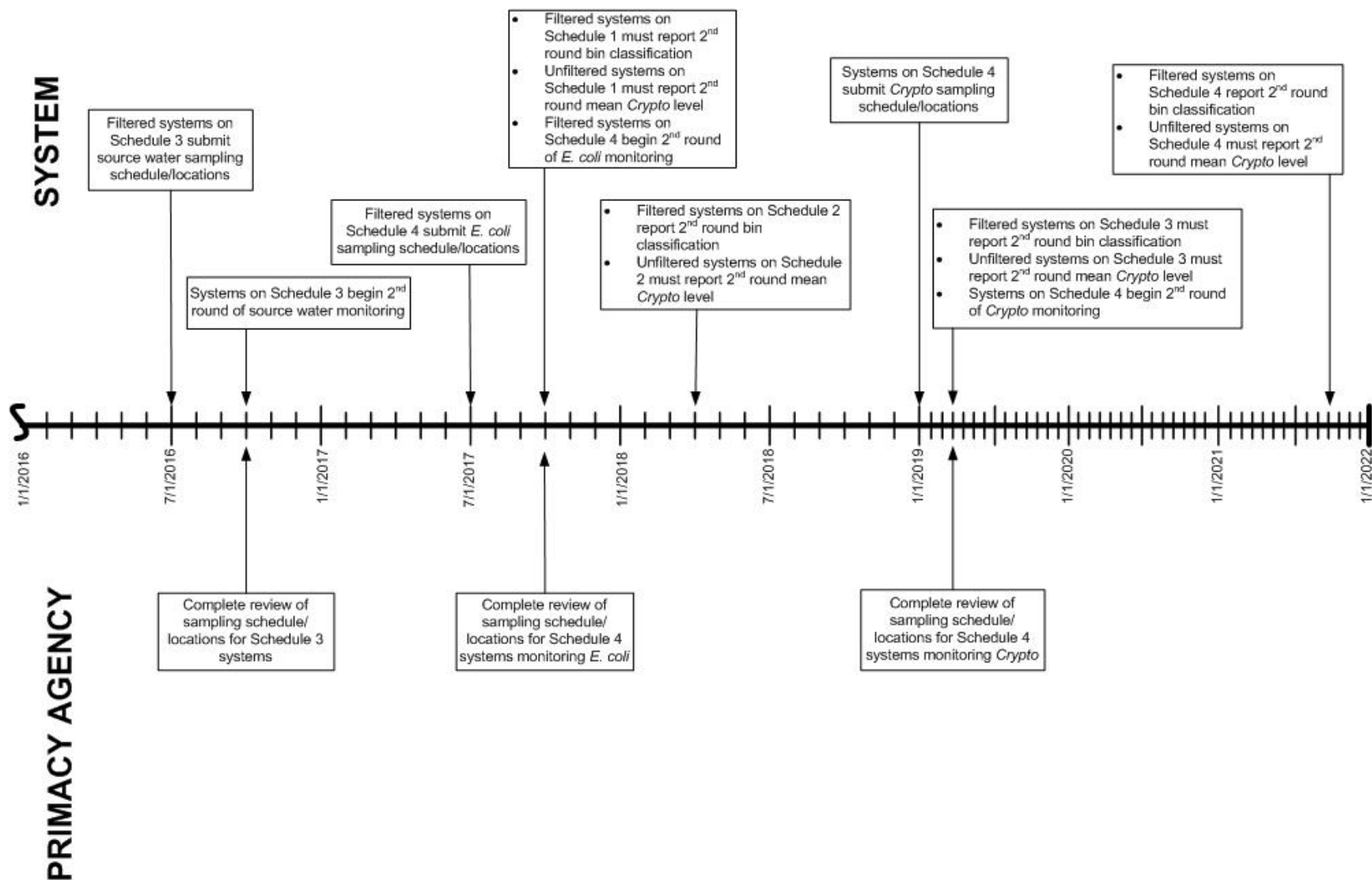


Figure 3-1. Timeline of System and Primacy Agency Activities (cont.)



### 3.3.1 Source Water Monitoring

Under the LT2ESWTR, all systems that use surface water or GWUDI as a source are required to conduct source water monitoring which may include *Cryptosporidium*, *E. coli*, and/or turbidity.

Systems that already provide 5.5-log (filtered systems) or 3.0-log (unfiltered systems) total treatment for *Cryptosporidium*, or that commit to providing this level of treatment by the applicable compliance deadline, are not required to conduct source water monitoring.

- \$ Large systems (those serving 10,000 or more persons) that filter are required to monitor all three parameters.
- \$ Small systems (those serving fewer than 10,000 people) that filter are required to monitor for *E. coli* initially and, depending on those results, may be required to monitor for *Cryptosporidium*.
- \$ Large and small unfiltered systems are required to monitor for *Cryptosporidium* on the same schedule as their filtered counterparts, unless they elect to provide 3.0-log *Cryptosporidium* inactivation.

Previously collected (“grandfathered”) data may be acceptable in some cases in lieu of monitoring, as long as specified criteria are met. EPA or the state must receive the grandfathered data no later than 2 months after the system is required to begin monitoring. EPA or the state can disapprove the data if it was generated during conditions that were not normal for the system (e.g., during a drought).

### 3.3.2 *Cryptosporidium* Treatment

For all systems required to conduct source water monitoring, the results of the source water monitoring determine whether additional *Cryptosporidium* treatment requirements will be necessary beyond those required by the IESWTR and LT1ESWTR. As shown in Table 1-1 on page 12, the lowest “bin” for filtered systems does not require any additional treatment. However, unfiltered systems must provide at least 2.0-log inactivation of *Cryptosporidium* for source water concentration of  $\leq 0.01$  oocyst/L and 3.0-log for  $> 0.01$  oocysts/L. Additionally, all unfiltered systems must provide at least two methods of disinfection. Each of the methods must provide either 4.0-logs of virus inactivation, 3.0-logs of *Giardia* inactivation, or 2.0-logs of *Cryptosporidium* inactivation. The disinfection processes provided by unfiltered systems must collectively meet all 3 inactivation requirements (i.e., for viruses, *Giardia*, and *Cryptosporidium*).

### 3.3.3 Disinfection Profiling and Benchmarking

The IESWTR and LT1ESWTR required disinfection profiling and benchmarking for CWS and nontransient noncommunity water systems (NTNCWS) that exceed TTHM or HAA5 levels of 0.064 mg/L and 0.048 mg/L, respectively. Under these rules, profiling and benchmarking was calculated for *Giardia lamblia* inactivation. If ozone, chloramines, or chlorine dioxide was used as the primary disinfectant then profiling and benchmarking for viruses was also required. The LT2ESWTR extends the requirements to all CWS and NTNCWS that must monitor for *Cryptosporidium* (i.e., not just those that exceed the TTHM or HAA5 triggers) and small CWS and NTNCWS that only conduct *E. coli* monitoring. In addition, all systems required to conduct disinfection profiling and benchmarking must include virus inactivation under the LT2ESWTR. Systems that have previously conducted profiling under IESWTR or LT1ESWTR and have not made a significant change to disinfection practices and sources since the data was collected may use that data in calculating benchmarks under LT2ESWTR, assuming

that the data are substantially equivalent to those required under LT2 (i.e., equivalent in sample number, frequency, and data quality).

The LT2ESWTR disinfection profiling and benchmarking requirements apply to SWTR CWSs and NTNCWSs that plan to make a significant change to their disinfection practices. Significant changes include:

- \$ Changes to the point of disinfection,
- \$ Changes to the disinfectant(s) used in the treatment plant,
- \$ Changes to the disinfection process, or
- \$ Any other disinfection modification the state identifies as significant.

### 3.3.4 Uncovered Finished Water Reservoirs

The IESWTR and LT1ESWTR prohibit the construction of new uncovered reservoirs for finished water but did not address existing uncovered reservoirs. The LT2ESWTR requires systems with existing uncovered finished water reservoirs to either cover the reservoir or treat the reservoir discharge to achieve 4.0-log virus, 3.0-log *Giardia*, and 2.0-log *Cryptosporidium* inactivation using a protocol approved by the state.

## 3.4 Communicate LT2ESWTR Requirements to Affected Systems

If not already done by EPA or the state, states should consider notifying PWSs of the source water monitoring and resulting treatment requirements under the LT2ESWTR as soon as possible.

### 3.4.1 Source Water Monitoring Requirements

Table 3-2 summarizes the source water monitoring requirements and compliance dates for all systems.

**Table 3-2. Source Water Monitoring Requirements and Compliance Dates**

Requirement	Compliance Date (System Size)
<b>Large filtered systems must monitor their source water for <i>Cryptosporidium</i>, <i>E. coli</i>, and turbidity, and large unfiltered systems must monitor for only <i>Cryptosporidium</i>.</b> <sup>1, 2</sup>	
Submit sampling schedule	<i>Schedule 1:</i> July 1, 2006 <i>Schedule 2:</i> January 1, 2007 <i>Schedule 3:</i> January 1, 2008
Sample/monitor on at least a monthly basis for a 24 month period	Begin no later than: <i>Schedule 1:</i> October 1, 2006 <i>Schedule 2:</i> April 1, 2007 <i>Schedule 3:</i> April 1, 2008



Requirement	Compliance Date (System Size)
Conduct second round of source water monitoring on at least a monthly basis for a 24 month period	Begin no later than: <i>Schedule 1:</i> April 1, 2015 <i>Schedule 2:</i> October 1, 2015 <i>Schedule 3:</i> October 1, 2016
<b>Small filtered systems must first monitor for <i>E. coli</i> or an alternative state-approved indicator of <i>Cryptosporidium</i>.<sup>1,2</sup> They may choose to monitor for <i>Cryptosporidium</i> in lieu of <i>E. coli</i>.</b>	
Submit <i>E. coli</i> sampling schedule	<i>Schedule 4:</i> July 1, 2008
Sample for <i>E. coli</i> or alternative indicator on at least a biweekly basis for a 12 month period	<i>Schedule 4:</i> Begin no later than October 1, 2008
<b>If the average indicator concentration exceeds the trigger level,<sup>3,4</sup> then the small filtered system must monitor for <i>Cryptosporidium</i>. Small unfiltered systems must monitor for <i>Cryptosporidium</i>.</b>	
Submit <i>Cryptosporidium</i> sampling schedule	<i>Schedule 4:</i> January 1, 2010
Sample for <i>Cryptosporidium</i> in accordance with sampling schedule	<i>Schedule 4:</i> Begin no later than April 1, 2010
Second round of source water <i>E. coli</i> monitoring <sup>2</sup>	<i>Schedule 4:</i> Begin no later than October 1, 2017
Second round of source water <i>Cryptosporidium</i> monitoring	<i>Schedule 4:</i> Begin no later than April 1, 2019

1. Systems may be eligible to use previously collected (grandfathered) data to meet *Cryptosporidium* monitoring requirements if specified quality control criteria are met.

2. Systems are not required to monitor if they will provide at least 5.5-log *Cryptosporidium* treatment and notify EPA or the state.

3. Trigger levels are *E. coli* annual mean concentration of 10/100 mL for systems using lakes/reservoir sources and 50/100 mL for systems using flowing stream sources.

4. Systems that do not exceed the *E. coli* trigger level are classified in Bin 1 and are not required to provide *Cryptosporidium* treatment beyond LT1ESWTR levels.

States should consider how they will implement source water monitoring and treatment requirements. For example, if a large system finds high levels of *Cryptosporidium* in their source water, the state should encourage or require small systems that obtain water from the same source to provide additional treatment, regardless of their monitoring results (especially if large systems upstream are classified in Bin 4).

Although systems that provide 5.5-log (filtered systems) or 3.0-log (unfiltered systems) total treatment for *Cryptosporidium* are not required to conduct source water monitoring, states should ensure the treatment meets the requirements of the toolbox options as well as any state standards. Systems should be aware that the treatment may trigger profiling and benchmarking requirements, change disinfection byproduct formation, and affect consecutive systems. States should refer systems that intend to provide the maximum treatment level to EPA's *Simultaneous Compliance Manual for LT2 and Stage 2 DBP Rules*.

### 3.4.1.1 Grandfathered Data

Systems may elect to use *Cryptosporidium* data collected before the system is required to begin monitoring. Because deadlines for larger systems that request state approval of grandfathered data occur soon after rule promulgation, states are encouraged to work with EPA to ensure systems are informed of

the requirements in time to meet the associated deadlines and make arrangements with an approved laboratory.

Systems that plan to use previously collected monitoring results must report that they intend to submit these results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether the system intends to conduct additional monitoring to meet the initial source water monitoring requirements of §141.701(a). Systems must report this information no later than 3 months prior to the date that they must begin their first round of source water monitoring. Systems must then report previously collected monitoring results for grandfathering, along with the associated documentation listed below, no later than 2 months after the date that they must begin their first round of source water monitoring.

A PWS's grandfathered data package must address the following conditions [§141.707]:

- \$ Samples must have been collected from the location(s) that complies with §141.703.
- \$ The data set must include and the system must certify that the samples were representative of a plant's source water(s) and the source water(s) has not changed.
- \$ The system must certify that all samples that were collected during the time period beginning with the first reported result and ending with the last reported result were submitted.
- \$ Samples must have been collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999 (when EPA Method 1622 was first released as an inter-laboratory validated method). (The state may grant exceptions to this requirement based on §141.707(e)(1).)
- \$ Samples must have been collected in equal intervals of time over the entire collection period (e.g., weekly, twice-per-month, monthly). (The state may grant exceptions to this requirement based on §141.707(e)(2).)
- \$ For *Cryptosporidium*, sample volumes of at least 10 L must have been analyzed or, in cases where 10 L were not analyzed, at least 2 mL of packed pellet volume must have been analyzed.
- \$ The data must have been generated by approved laboratories using approved analytical methods (for *E. coli*), and using the validated versions of EPA Methods 1622 or 1623 (for *Cryptosporidium*).
- \$ For *Cryptosporidium*, the data are fully compliant with the QA/QC criteria specified in the LT2ESWTR and the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (c)(1) of this section were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms.

Requirements and guidance associated with the above recommendations are discussed in more detail in EPA's *Source Water Monitoring Guidance for Public Water Systems*. In addition, the guidance provides information on criteria for grandfathered data.

States may allow systems to conduct further monitoring to supplement incomplete data, or to replace results that do not appear to be representative of normal source water conditions. To make this determination, states should review the reported data to ensure that samples were evenly spaced throughout the monitoring period, especially during periods where runoff normally occurs. If monitoring was not conducted during runoff periods (or other periods normally associated with reduced water quality conditions, such as seasonal wastewater discharges), additional monitoring should be conducted. States should review the submitted reports *as soon as possible* to allow systems to make arrangements for additional source water monitoring, where necessary. Where additional monitoring is required by the state, systems are not required to begin this additional monitoring until 2 months after notification that data have been rejected or that additional monitoring is necessary.

### **3.4.1.2 Sampling Schedule and Locations**

States should ensure systems select locations and times that meet the requirements discussed in section 1.2. Systems' schedules should coincide with obvious water quality events, such as runoff and seasonal wastewater discharges. For example, if stream flow records indicate that the heaviest seasonal runoff is at the end of March or early April, then the system should consider monitoring during this period or conduct additional monitoring to ensure this period is represented. More frequent monitoring may also be appropriate during seasonal periods of heavy rainfall. Note that if states wish to require more frequent monitoring, they should ensure that they have authority to do so.

Systems must collect source water samples for each plant at a location prior to any treatment, unless EPA or the state determines that collecting a sample before treatment is not feasible and the treatment is unlikely to have an adverse effect on sample analysis. EPA or the state may allow one set of results to be used for multiple plants if more than one plant draws water from the same influent.

Treatment plants may use multiple surface water sources and blended surface water and ground water sources. The use of multiple sources during monitoring must be consistent with routine operational practice. If there is a sampling tap after the sources are combined but prior to treatment, the sample should be collected from that tap. If no such tap is available, the system has two options:

1. Collect separate samples from each source and have the laboratory analyze each sample independently and calculate a weighted average concentration based on the relative contribution to total influent flow by each source; or
2. Manually collect bulk water samples from each source and mix the samples to create a composite bulk sample based on the proportional contribution of each source to the plant's influent flow.

If either of these two methods is used to manually create a representative source water sample from more than one source, states may wish to review the system's proposal for obtaining a valid sample. If one or more of the raw water sources are of low quality, the source(s) should not be under- or over-represented. For example, if a system typically uses a low quality source in combination with another source(s), but occasionally uses the low quality source by itself, the state should determine whether sampling should occasionally represent only that low quality source. This issue could be a critical concern for systems with sources of varying quality and may be necessary to ensure normal operating practices are captured through monitoring.

States should remind systems to make arrangements with laboratories as soon as possible to ensure their source water monitoring needs can be met. In addition, systems should ensure their laboratory will perform the necessary sample filtration if the system does not intend to filter their samples in the field.

Finally, states should remind systems to use an approved analytical method and an approved laboratory. EPA's Web site provides information on laboratories approved for *Cryptosporidium* analysis: [www.epa.gov/safewater/disinfection/lt2/lab\\_aprvlabs.html](http://www.epa.gov/safewater/disinfection/lt2/lab_aprvlabs.html).

### 3.4.1.3 Calculating Average *Cryptosporidium* Concentrations

Individual *Cryptosporidium* sample concentrations are calculated using the total number of oocysts counted, unadjusted for method recovery, divided by the volume assayed. If no oocysts are found in a sample, then the concentration value for that sample is zero (i.e., not the detection limit). The range of *Cryptosporidium* concentrations that define LT2ESWTR bins reflects consideration of analytical method recovery and the percent of *Cryptosporidium* oocysts that are assumed to be infectious. Consequently, sample analysis results will not be adjusted for these factors.

*Cryptosporidium* bin concentrations are calculated by averaging individual sample results from one or more years of monitoring. For unfiltered systems, the average is the mean of all the sample concentrations. For filtered systems, the method used to determine the average differs based on the number of samples collected as follows:

1. For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.
2. For systems that collect a total of at least 24 samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected.
3. For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.
4. For systems with plants operating only part of the year that monitor fewer than 12 months per year under §141.701(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.
5. If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring; then use these monthly average concentrations, rather than individual sample concentrations, and one of the previous 4 procedures to calculate average *Cryptosporidium* concentration.

### Example 3-1. Bin Classification for System Operating Part of Year

A system collects a sample every 2 weeks during the 3 months that its plant operates. If the number of samples or sampling frequency varied, the system would have to calculate its bin classification differently.

Plant <i>Crypto</i> Results (oocysts/L)					
Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
N/A	N/A	N/A	N/A	N/A	0.081 0.072
Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
0.035 0.002	0.000 0.003	N/A	N/A	N/A	N/A
Month 13	Month 14	Month 15	Month 16	Month 17	Month 18
N/A	N/A	N/A	N/A	N/A	0.046 0.055
Month 19	Month 20	Month 21	Month 22	Month 23	Month 24
0.002 0.005	0.072 0.002	N/A	N/A	N/A	N/A

- Add up all results in year 1 (Month 1 through Month 12) =  
 $(0.081 + 0.072 + 0.035 + 0.002 + 0.000 + 0.003) = 0.193$  oocysts/L
- Add up all results in year 2 (Month 13 through Month 24) =  
 $(0.046 + 0.055 + 0.002 + 0.005 + 0.072 + 0.002) = 0.182$  oocysts/L
- Divide sum by total number of results in year 1 =  $0.193/6$
- Result is arithmetic mean = 0.032 oocysts/L

Bin classification is based on year 1 because it has the highest average of all sample concentration during any 12-month period.

This system would be classified in Bin 1, since its *Cryptosporidium* level is less than 0.075 oocysts/L.

Although PWSs are responsible for monitoring and calculating their own bin classification, states should plan on reminding PWSs of the requirements and verifying the calculated bin classifications.

#### 3.4.2 *Cryptosporidium* Treatment Requirements and Compliance Dates

Unfiltered systems will use their average *Cryptosporidium* concentration from source water monitoring to determine their bin assignments and additional *Cryptosporidium* treatment requirements. Unfiltered GWUDI systems can fall into one of two categories:

- \$ Systems that receive filtration credit for filtration through the soil are treated as filtered systems.
- \$ Systems that do not receive credit for filtration, but meet filtration avoidance, are treated as unfiltered systems.

Table 3-3 shows the treatment requirements for filtered systems according to existing treatment processes. Table 3-4 shows the treatment requirements for unfiltered systems.

**Table 3-3. *Cryptosporidium* Treatment Requirements for Filtered Systems**

If the source water <i>Cryptosporidium</i> concentration in oocyst/L is...	And the system uses the following filtration treatment in full compliance with SWTR, IESWTR, and LT1ESWTR (as applicable), then the additional treatment requirements are...			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
< 0.075.....Bin 1	None	None	None	None
≥ 0.0075 and < 1.0....Bin 2	1.0-log treatment...	1.5-log treatment...	1.0-log treatment...	(1)
≥ 1.0 and < 3.0.....Bin 3	2.0-log treatment...	2.5-log treatment...	2.0-log treatment...	(2)
≥ 3.0.....Bin 4	2.5-log treatment...	3.0-log treatment...	2.5-log treatment...	(3)

1. As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.

2. As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.

3. As determined by the state such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

**Table 3-4. *Cryptosporidium* Treatment Requirements for Unfiltered Systems**

If the source water <i>Cryptosporidium</i> concentration in oocyst/L is...	<i>Cryptosporidium</i> inactivation with either chlorine dioxide, ozone, or UV
≤ 0.01	2.0-log inactivation
> 0.01	3.0-log inactivation

Filtered systems can use at least one of the treatment and management techniques in the “microbial toolbox” (described in section 3.8). Those in Bins 3 and 4 must achieve at least 1.0-log credit towards additional treatment using at least one of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV.

Unfiltered systems are required to use at least two different disinfectants to meet their overall inactivation requirements for viruses (4.0-log), *Giardia lamblia* (3.0-log), and *Cryptosporidium* (2.0 or 3.0-log). Each of the disinfectants must separately achieve the total inactivation required for at least one of the three pathogen types. The disinfection processes provided by unfiltered systems must collectively meet all 3 inactivation requirements (i.e., for viruses, *Giardia* and *Cryptosporidium*). For example, a system may use chloramines to meet virus inactivation requirements and UV to meet *Cryptosporidium* inactivation requirements; the system can meet *Giardia* inactivation requirements using UV or chloramines separately.

#### Compliance Dates

Filtered and unfiltered systems must achieve the additional treatment by the following dates:

- \$ Systems serving 100,000 people or more, no later than April 1, 2012.
- \$ Systems serving 50,000 to 99,999 people, no later than October 1, 2012.
- \$ Systems serving 10,000 to 49,999 people, no later than October 1, 2013.
- \$ Small systems fewer than 10,000 people, no later than October 1, 2014.

Wholesale systems must follow the schedule based on the population of the largest system in their combined distribution system. For systems making capital improvements, states may grant up to 2 additional years to comply.

### **3.4.3 Disinfection Profiling and Benchmarking**

Disinfection profiling is conducted over a 12-month period and must be completed if a system plans to make a significant change to its disinfection practice. Previously collected data (i.e., disinfection profiles prepared to satisfy the requirements of the IESWTR or LT1ESWTR) may be used by systems that have not made significant changes in disinfection practices nor changed sources since the data were collected. Significant changes are defined as:

1. Moving the point of disinfection (does not include routine seasonal changes approved by the state);
2. Changing the type of disinfectant;
3. Changing the disinfectant process; or
4. Making other modifications designated as significant by the state.

Systems that developed *Giardia* disinfection profiles, but not virus disinfection profiles, under the IESWTR or LT1ESWTR may calculate virus profiles from the same operational data used to develop the *Giardia* profiles.

Under the IESWTR and LT1ESWTR, disinfection profiles and benchmarks are required to be kept on file for the state to review during the sanitary survey. In addition, any systems required to develop a disinfection profile for *Giardia* and viruses that plan to make significant changes in disinfection practice are required to calculate a benchmark and submit to the state for review: an evaluation of the disinfection profile; and an analysis of how the proposed change will affect the current benchmark.

EPA developed the *Disinfection Profiling and Benchmarking Guidance Manuals* for the IESWTR and LT1ESWTR. These manuals provide instruction to systems and states on the development of disinfection profiles, identification and evaluation of significant changes in disinfection practices, and considerations for setting an alternative benchmark.

### **3.4.4 Uncovered Finished Water Reservoir Requirements**

Systems with uncovered finished reservoirs must cover the reservoir or treat reservoir discharge to 4.0-log virus, 3.0-log *Giardia*, and 2.0-log *Cryptosporidium* inactivation and/or removal by April 1, 2009, or be in compliance with a state-approved alternative schedule.

### 3.4.5 Methods of Communication

#### 3.4.5.1 Written Notification

Providing written notice of a final rule for PWSs serves two purposes: 1) the receiving system obtains a formal notice of upcoming regulatory requirements and a timeline for compliance (in addition to EPA's publication of the Rule in the *Federal Register*); and 2) the primacy agency has a hard-copy document that it may file and use in subsequent compliance tracking efforts.

Written notification can be in the form of a letter from the state to affected systems. The letter should include a summary of rule requirements and timeframes and direct the reader to an appropriate contact if questions arise. States should consider including fact sheets or other summary materials with the letter. Appendix C of this guidance includes additional publications that are intended to be distributed to water systems through mailings, training sessions, or other educational forums. These publications are also available at [www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2). They provide overviews of the LT2ESWTR to help systems understand the provisions of the Rule and determine which provisions apply to their system. They also describe the benefits and general implications of the Rule. Although valuable, these resources do not substitute for official rule language. States should consider mailing official rule language with the letter or including in the letter the Web site address where the regulatory language can be accessed. States should also consider posting these materials on their Web sites for easy access.

A sample letter notifying systems of their schedule number and LT2ESWTR requirements is provided in Example 3-1. States may wish to develop similar letters and tailor the messages for the appropriate size categories covered by the Rule, or to accommodate those systems for which the provisions are either limited or unique.

In addition to notifying systems of their requirements, states may also want to consider providing written notice to a system on the status of their LT2ESWTR submitted compliance documents. Templates for these letters can be found in Appendix E. Written notification should include:

- \$ Summary of the issue.
- \$ Appropriate contact if questions arise.
- \$ Fact sheet or other summary materials (optional).



### Example 3-2. Sample Letter Notifying Systems of Schedule Number

State Letterhead

System Name  
System Address  
City State Zip

October 15, 2006

★ ★ ★ Important New Rule Roll Out ★ ★ ★  
**Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) – Schedule 3**

The LT2ESWTR was published in the *Federal Register* on January 5, 2006. The goal of the new LT2ESWTR is to reduce the risk of disease caused by *Cryptosporidium* and other microorganisms by identifying the systems at the greatest risk for source water contamination. EPA finalized both the LT2ESWTR and the Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) at the same time. Together, these rules will improve protection against microbial contamination while reducing risks from disinfection byproducts. Please be sure to also read the enclosed information regarding the Stage 2 DBPR.

Under the LT2ESWTR, filtered systems will need to collect source water *Cryptosporidium*, *E. coli*, and turbidity samples once per month from every surface water or ground water under the direct influence of surface water (GWUDI) source for a period of 24 months. However, if you already have monitoring data for these contaminants, you may be able to “grandfather” the data. The LT2ESWTR will also allow you to grandfather just *Cryptosporidium* data without the associated *E. coli* and turbidity data.

Unfiltered systems will need to collect source water *Cryptosporidium* samples at least once per month for 24 months. However, if you already have monitoring data for *Cryptosporidium*, you may be able to “grandfather” the data.

Instead of conducting source water monitoring or submitting grandfathered data, systems may choose to provide the maximum treatment required by the LT2ESWTR. Download the LT2ESWTR from EPA’s website at [www.epa.gov/safewater/disinfection/lt2/regulations.html#prepub](http://www.epa.gov/safewater/disinfection/lt2/regulations.html#prepub).

EPA and state records show that your system is required to comply with the source water monitoring requirements on **Schedule 3**. These requirements are based on the information that your system:

- Serves 10,000 to 49,999 people **OR** sells water and the largest system in your combined distribution system serves 10,000 to 49,999 people; and
- Treats surface water or GWUDI source.

A combined distribution system is a group of water systems that buy/sell water from/to each other. If you believe our records are incorrect, or you have a question, please notify us at [stage2mdbp@epa.gov](mailto:stage2mdbp@epa.gov) as soon as possible, or contact the “Contact Person” listed for your state at: [www.epa.gov/safewater/disinfection/lt2/pdfs/contacts\\_lt2\\_compliancehelp.pdf](http://www.epa.gov/safewater/disinfection/lt2/pdfs/contacts_lt2_compliancehelp.pdf).

By **January 1, 2008** (3 months prior to beginning source water monitoring), Schedule 3 systems must submit to EPA a sampling schedule and description of sample location(s), and/or provide a notice stating you plan to submit grandfathered data, or a notice that you intend to provide additional treatment rather than monitor source water.

Enclosed is a Quick Reference Guide that provides information on the requirements of the LT2ESWTR. In addition, EPA has developed a number of guidance documents and factsheets to help systems through this process that may be found at [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html).

#### **LT2ESWTR Guidance Material**

- **Source Water Monitoring Guidance Manual for Public Water Systems for the Long-Term 2 Enhanced Surface Water Treatment Rule** (EPA 815-R-06-005) – Provides surface water systems, laboratories, states, and Tribes with a review of the source water monitoring provisions. This guidance manual provides direction to the systems regarding how, where, and when to monitor, how to report the data, how to submit “grandfathered” data (e.g., previously collected data), and how evaluate data and determine risk bin classification for filtered systems and treatment requirements for unfiltered systems.
- **LT2ESWTR Factsheets** – EPA has developed several factsheets that summarize information on various topics pertaining to the LT2ESWTR. The factsheets are:
  - Factsheet: Source Water Monitoring for the LT2ESWTR: Systems Serving At Least 10,000 People
  - Long Term 2 Enhanced Surface Water Treatment Rule: Data Collection and Tracking System
  - Long Term 2 Enhanced Surface Water Treatment Rule: Lab Fact Sheet

#### **Other LT2ESWTR Guidance Materials**

For additional guidance on implementing the LT2ESWTR, you can refer to the following EPA materials located at: [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html).

- On-line Sample Collection Module ([www.epa.gov/safewater/lt2/training/index.html](http://www.epa.gov/safewater/lt2/training/index.html)).

Your state may have state-specific materials to assist you in complying with the LT2ESWTR.

#### **How to get copies of EPA guidance materials**

To obtain copies of the materials listed above you can:

- Download materials at [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html).
- Call the Safe Drinking Water Hotline at 1-800-426-4791.
- Call the National Service Center for Environmental Publications at 1-800-490-9198 or visit their Web site at [www.epa.gov/ncepihom](http://www.epa.gov/ncepihom).

To determine if your state drinking water agency or EPA is implementing the LT2ESWTR you may contact the Safe Drinking Water Hotline, or visit the LT2ESWTR website at [www.epa.gov/safewater/disinfection/lt2/compliance.html](http://www.epa.gov/safewater/disinfection/lt2/compliance.html).

#### **Training Opportunities**

EPA will present webcasts on the LT2ESWTR and Stage 2 DBPR and Compliance Assistance Tools for Water Systems.

These webcasts will be open to system operators and regulators. Registration information maybe found on the Drinking Water Academy website at [www.epa.gov/OGWDW/dwa/calendar.html](http://www.epa.gov/OGWDW/dwa/calendar.html).

### 3.4.5.2 Slide Presentation

Slide presentations of the LT2ESWTR may be used by state staff, technical assistance, or other training providers to present the background of the Rule, rule requirements, and its benefits.

EPA developed a “Train the Trainer” program, Webcasts, and in-person training sessions to assist with implementation of the LT2ESWTR. States should coordinate with technical assistance providers for any training sessions. Materials used for the training sessions are available on EPA’s Web site at [www.epa.gov/safewater/disinfection/training.html](http://www.epa.gov/safewater/disinfection/training.html).

The EPA Drinking Water Academy compiles PowerPoint training sessions on the LT2ESWTR. Copies of the presentations may be used to train other state personnel and technical assistance resources, water system personnel, and the public. EPA’s Drinking Water Academy slides are available electronically on EPA’s Web Site at [www.epa.gov/safewater/dwa.html](http://www.epa.gov/safewater/dwa.html).

### 3.4.5.3 Guidance Documents and Seminars

Technical guidance documents developed for the LT2ESWTR are useful for conveying rule requirements and specific aspects of rule implementation to state staff and system staff and operators. These aspects include source water monitoring and selecting and implementing options from the microbial toolbox. The guidance documents can be used as stand-alone references or as supporting materials in LT2ESWTR-specific training events. See section 2 of this manual for more information on these references. Links to these documents can be provided on state Web sites.

## 3.5 Update Data Management Systems

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Although state data management systems vary to suit state-specific requirements and needs, EPA recommends that all states update their data systems in light of the LT2ESWTR to enable efficient tracking of affected systems, compliance status, and other information useful in implementing this rule.

As required under §142.14, records to be kept by states under the LT2ESWTR include the following:

- \$ Results of source water *Cryptosporidium* and *E. coli* monitoring.
- \$ *Cryptosporidium* bin classification for each filtered system, including any changes to initial bin classification based on the watershed assessment conducted during the sanitary survey or the second round of monitoring.
- \$ For each unfiltered system, the determination of whether the mean source water *Cryptosporidium* level is above 0.01 oocysts/L and whether that determination changes with the second round of monitoring.
- \$ The treatment processes or control measures that each system employs to meet LT2ESWTR requirements.
- \$ A list of systems required to cover or treat the discharge of an uncovered finished water reservoir.

While many of these records may be maintained through hard-copy files, it may be helpful to have data systems that easily identify systems for which these records exist.

Because source water monitoring by large systems will begin 9 months following promulgation of the LT2ESWTR, EPA expects to act as the primacy agency with oversight responsibility for large system sampling, analysis, and data reporting. To facilitate collection and analysis of large system monitoring data, EPA is developing an internet-based electronic data collection and tracking system. This approach is similar to that used under the Unregulated Contaminant Monitoring Rule (UCMR). Analytical results for *Cryptosporidium*, *E. coli*, and turbidity will be reported directly to this database using web forms and software that can be downloaded free of charge. EPA will make large system monitoring data available to states when states assume primacy for the LT2ESWTR, or earlier under a state agreement with EPA.

### **3.6 Ensure that Ongoing Watershed Assessment is Conducted and Adjust Treatment Requirements**

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Because treatment requirements are related to the degree of source water contamination, the LT2ESWTR contains provisions to assess changes in a system's source water quality following initial bin classification. After completion of the initial round of *Cryptosporidium* monitoring, EPA requires that states conduct a follow-up source water assessment as part of the ongoing sanitary survey process. During the sanitary survey, the state must determine whether significant changes have occurred in the watershed that could lead to increased contamination of the source water and what appropriate follow-up action is needed.

Developing a plan to assess the watershed and determine appropriate follow-up action is a special primacy condition of the LT2ESWTR (see section 4.4.1 for guidance to address this special primacy condition).

### **3.7 Award *Cryptosporidium* Removal Credit for Primary Treatments in Place**

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Under IESWTR and LT1ESWTR, conventional treatment systems and slow sand or diatomaceous earth filtration systems received 2.0-log *Cryptosporidium* removal credit. As stated in the preamble to LT2ESWTR, EPA estimated (based on the review of numerous studies) that these systems that are in compliance with IESWTR and LT1ESWTR are capable of achieving 3.0-log removal; therefore, EPA recommends a 3.0-log removal credit be awarded. Additionally, EPA recommends that direct filtration plants (that lack a sedimentation basin) be awarded 2.5-log removal credits. It is the states' discretion to determine how to address these changes in their regulations. EPA is unable to recommend an average log removal credit for alternative filtration technologies like membranes, bag filters, and cartridge filters due to variability among products. As a result, credit for these devices must be determined by the state.

EPA's *Membrane Filtration Guidance Manual* provides guidance for conducting and evaluating challenge tests, as well as routine integrity testing and monitoring requirements to ensure the necessary level of treatment is maintained. Most membrane processes will likely achieve 5.5-log *Cryptosporidium* removal that allows systems to avoid source water monitoring requirements.

EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for challenge testing bag and cartridge filters. Note that the guidance is directed towards testing of bag and cartridge filters that follow primary filtration and provide an additional 2.0-log and 2.5-log credit. While most of the guidance is still

applicable to primary treatment, states should evaluate all aspects of the bag or cartridge filter process with respect to actual source water quality.

As described in §141.718, a state may award greater credit to a system that demonstrates through a state-approved protocol that it reliably achieves a higher level of *Cryptosporidium* removal. Conversely, a state may award less credit to a system where the state determines, based on site-specific information, that the system is not achieving the degree of *Cryptosporidium* removal indicated in Table 3-5.

**Table 3-5. Suggested *Cryptosporidium* Removal Credit Towards LT2ESWTR Requirements for Well-Run Water Treatment Plants<sup>1</sup>**

Plant type	Conventional treatment (includes softening plants)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Treatment credit	3.0-log	2.5-log	3.0-log	Determined by state

1. Applies to plants in full compliance with the SWTR, IESWTR, and LT1ESWTR as applicable

### 3.8 Award *Cryptosporidium* Removal Credit for Implementation of Options from the Microbial Toolbox

In order to achieve the *Cryptosporidium* removal requirements of the bin categories, systems must supplement the removal credit they receive for primary TTs by implementing options from the microbial toolbox. Each toolbox option is associated with a certain log removal or inactivation credit. Table 3-6 summarizes presumptive credits and associated design and implementation criteria for microbial toolbox components.

**Table 3-6. Microbial Toolbox: Options, Log Credits, and Summary of Design/Implementation Criteria**

Toolbox Option	<i>Cryptosporidium</i> log credit with design and implementation criteria
<b>Source Toolbox Components</b>	
Watershed control program	0.5-log credit for state-approved program including EPA-specified elements. (Section 3.8.1)
Alternative source/intake management	No presumptive credit. Systems may conduct simultaneous monitoring for LT2ESWTR bin classification at alternative intake locations or under alternative intake management strategies. (Section 3.8.2)
<b>Pre-filtration Toolbox Components</b>	
Pre-sedimentation basin with coagulation	0.5-log credit with continuous operation and coagulant addition; basins must achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative state-approved performance criteria; all flow must pass through the basins. (Section 3.8.3)

<b>Toolbox Option</b>	<b><i>Cryptosporidium</i> log credit with design and implementation criteria</b>
Two-stage lime softening	0.5-log additional credit for two-stage softening (single-stage softening is credited as equivalent to conventional treatment). Chemical addition and hardness precipitation must occur in both stages, and both stages must treat 100% of the flow. (Section 3.8.4)
Bank filtration (as pretreatment)	0.5-log credit for 25 ft. setback; 1.0-log credit for 50 ft. setback; aquifer must contain granular material and in at least 90 percent of the length of a core, grains less than 1.0 mm in diameter constitute 10 percent of the material; average turbidity must be less than 1 NTU; no presumptive credit for bank filtration that serves as pretreatment when source water monitoring is performed from the well (after bank filtration). (Section 3.8.5)
<b>Treatment Performance Toolbox Components</b>	
Combined filter performance	0.5-log credit for CFE turbidity $\leq 0.15$ NTU in 95 percent of samples each month. (Section 3.8.6)
Individual filter performance	0.5-log credit (in addition to 0.5-log combined filter performance credit) if IFE turbidity is $\leq 0.15$ NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. (Section 3.8.7)
Demonstration of performance	Credit awarded to unit process or treatment train based on demonstration to the state, through use of a state-approved protocol. (Section 3.8.8)
<b>Additional Filtration Toolbox Components</b>	
Bag filters	Up to 2.0-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety (for individual bag filters); up to a 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety (for bag filters in series). (Section 3.8.9)
Cartridge filters	Up to 2.0-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety (for individual cartridges) ; up to a 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety (for cartridges in series). (Section 3.8.9)
Membranes (microfiltration, ultrafiltration, nanofiltration, reverse osmosis)	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. (Section 3.8.10)
Second stage filtration	0.5-log credit for second separate granular media filtration stage; treatment train must include coagulation prior to first filter. (Section 3.8.11)
Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. (Section 3.8.12)
<b>Inactivation Toolbox Components</b>	
Chlorine dioxide	Log credit based on measured CT in relation to CT table. (Section 3.8.13)
Ozone	Log credit based on measured CT in relation to CT table. (Section 3.8.14)
UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. (Section 3.8.15)

Each component is described in more detail in the LT2ESWTR language. EPA developed the following guidance manuals to assist systems with implementing toolbox components: *UV Disinfection Guidance Manual*, *Membrane Filtration Guidance Manual*, and *LT2ESWTR Toolbox Guidance Manual*.

States award credit for toolbox options that are satisfactorily implemented. States should be prepared to assist systems in understanding the requirements associated with each toolbox option and selecting appropriate toolbox options. For most options, systems must monitor and/or report operating data to the state, on a monthly basis, verifying proper treatment was achieved. Sections 3.8.1 to 3.8.15 briefly describe each option and the associated requirements.

### **3.8.1 Watershed Control Program [40 CFR 141.716(a)]**

Watershed control programs are intended to reduce source water *Cryptosporidium* levels. A system's watershed control program must be approved by the state. Only filtered systems are eligible for watershed control program credits since unfiltered systems are already required to maintain a watershed control program that minimizes the potential for contamination by *Cryptosporidium* as a criterion to avoid filtration.

States will base their approval of a system's watershed control program on their review of the system's proposed watershed control plan and supporting documentation. States may revoke *Cryptosporidium* treatment credit for a watershed control program at any point if the state determines that a PWS is not implementing the approved watershed control plan.

#### **3.8.1.1 What are the Requirements for State Approval of Watershed Control Programs?**

States must receive notification from systems that intend to pursue a 0.5-log *Cryptosporidium* treatment credit for a watershed control program no later than 2 years before the applicable treatment compliance date. Notification includes the system proposing to develop a watershed control plan and submitting it for state approval.

States should ensure that systems' applications for initial program approval include the following minimum elements:

- \$ Identification of an "area of influence," outside of which *Cryptosporidium* or fecal contamination are significantly less likely to affect the treatment plant intake.
- \$ Identification of sources of *Cryptosporidium* contamination and an assessment of the impact of these sources on the system's source water quality.
- \$ An analysis of control measures that could address the identified potential and actual sources of *Cryptosporidium* contamination.
- \$ A plan that specifies goals and defines and prioritizes specific actions to reduce source water *Cryptosporidium* levels.

States must receive systems' proposed watershed control plan, a request for program approval, and a request for 0.5-log *Cryptosporidium* treatment credit no later than 1 year before the system's applicable treatment compliance date.

States will review the system's initial proposed watershed control plan and either approve or reject the plan. If the state approves the plan, the system will be awarded 0.5-log credit towards LT2ESWTR

*Cryptosporidium* treatment requirements. If the state rejects the plan, the state may work with the system to resolve the issues. If the state fails to respond to a system and the system meets all the requirements, the watershed control plan will be considered approved and 0.5-log *Cryptosporidium* treatment credit will be awarded. The state may subsequently withdraw this approval.

### **3.8.1.2 What are the System's Requirements for Maintaining State Approval of Watershed Control Programs?**

After the state has approved a system's watershed control program, the state should receive the following information from the system to continue to be eligible for the 0.5-log *Cryptosporidium* treatment credit:

- \$ An annual watershed control program status report.
- \$ A state-approved watershed sanitary survey report every 3 years for CWSs and every 5 years for NCWSs.

The annual watershed control program status report must describe the system's implementation of the approved plan and assess whether the plan achieved its goals. It must explain how the system is addressing any shortcomings in plan implementation, including any previously identified by the state or identified during the watershed sanitary survey. In addition, the plan must describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If the system determines changes to the watershed control program are necessary, the system must notify the state in advance of any changes and list any actions that may reduce the level of source water protection. Actions to mitigate any reductions in source water protection must also be identified.

The watershed sanitary survey must be conducted every 3 year for CWSs and every 5 years for NCWSs according to state guidelines and by persons approved by the state to conduct watershed surveys. The survey must encompass the area of the watershed that was identified in the state-approved watershed control plan as the area of influence and, at a minimum, assess the implementation of actions to reduce *Cryptosporidium* levels and identify any significant new sources of *Cryptosporidium*.

The annual status reports, watershed control plan, and annual watershed sanitary surveys must be made available to the public upon request. These documents must be in a plain language format and include criteria for evaluating the success of the program in achieving plan goals. The state may withhold portions of the annual status report, watershed control plan, and watershed sanitary survey from the public based on security considerations.

### **3.8.1.3 What Resources are Available to Systems and States?**

Source water assessments conducted by states under section 1453 of the SDWA can provide a foundation for assessing the vulnerability of a watershed by providing the preliminary analyses of watershed hydrology, a starting point for defining the area of influence, and an inventory and hierarchy of actual and potential contamination sources.

EPA developed the *LT2ESWTR Toolbox Guidance Manual* to assist water systems in developing their watershed control programs and states in their assessment and approval of these programs. The guidance addresses contamination by *Cryptosporidium* and other pathogens from both non-point sources (e.g., agricultural and urban runoff, septic tanks) and point sources (e.g., sewer overflows, publicly owned treatment works (POTWs), and concentrated animal feeding operations (CAFOs)). In addition, the guidance manual incorporates available information on the effectiveness of different control measures to reduce *Cryptosporidium* levels and provides case studies of watershed control programs. The manual also



includes resources available to assist systems in building partnerships and implementing watershed protection activities.

### **3.8.2 Alternative Source [40 CFR 141.716(b)]**

Plants may be able to reduce influent *Cryptosporidium* levels by changing the intake placement (either within the same source or to an alternate source) or by managing the timing or level of withdrawal. Because the effect of changing the location or operation of a plant intake on influent *Cryptosporidium* levels will be site-specific, states may not grant presumptive credit for this option. Rather, if a system is concerned that *Cryptosporidium* levels associated with the current plant intake location and/or operation will result in a bin assignment requiring additional treatment under the LT2ESWTR, the system may conduct concurrent *Cryptosporidium* monitoring reflecting a different intake location or different intake management strategy.

States should ensure that systems' concurrent monitoring conforms to the sample frequency, sample volume, analytical method, and other requirements that apply to the system for *Cryptosporidium* monitoring. The system must monitor its current plant intake in addition to any alternative intake location or withdrawal strategy, and must submit sampling plans for both strategies to the state 3 months prior to the start of sampling. In addition to all monitoring results, states should also receive supporting information from the system documenting the conditions under which the alternative intake location/management samples were collected. The state will then make a determination as to whether the plant may be assigned to an LT2ESWTR bin using alternative intake location/management monitoring results.

If a plant's bin assignment is based on a new intake operation strategy, it is important for the plant to continue to use this new strategy in routine operation. Therefore, the state must receive documentation from the system on its new intake operation strategy along with additional monitoring results.

### **3.8.3 Pre-sedimentation with Coagulant [40 CFR 141.717(a)]**

States may grant 0.5-log *Cryptosporidium* treatment credit to a system with a presedimentation process that achieves at least 0.5-log influent turbidity reduction [ $\log_{10}$  (monthly mean of daily influent turbidity) -  $\log_{10}$  (monthly mean of daily effluent turbidity)]. The system may also comply with state-approved performance criteria that demonstrate at least 0.5-log mean removal or micron-sized particulate material. In addition, the presedimentation process must comply with the following on a monthly basis: (1) continuous operation while the treatment plant is in use; (2) treat 100 percent of the plant flow; and (3) continuous addition of a coagulant. To be eligible for credit, PWSs must report compliance with these conditions to the state each month.

Alternatively, states may grant the 0.5-log *Cryptosporidium* treatment credit for presedimentation processes based on a demonstration of performance. Demonstration of performance provides an option for PWSs with presedimentation processes that do not meet the conditions for treatment credit previously discussed and for PWSs that wish to receive more than 0.5-log *Cryptosporidium* treatment credit for their presedimentation processes. Demonstration of performance criteria are described in section 3.8.8.

### **3.8.4 Two-stage Lime Softening [40 CFR 141.717(b)]**

States may grant 0.5-log credit to systems with two-stage lime softening plants. Lime softening is a process in which chemical addition and hardness precipitation occur in a clarifier prior to a filtration process. Lime softening can be categorized into two general types: (1) single-stage softening that includes a primary clarifier and filtration process; and (2) two-stage softening, which has a secondary clarifier after

the primary clarifier prior to the filtration process. Single-stage softening plants are not eligible for the 0.5-log credit. To grant the 0.5-log credit, the state must ensure that the plant has a second clarification stage between the primary clarifier and filtration process that is operated continuously and that both clarification stages treat 100 percent of the plant flow. Chemical addition and hardness precipitation must occur in both clarifiers.

### **3.8.5 Bank Filtration [40 CFR 141.717(c)]**

In order for a state to grant a system *Cryptosporidium* treatment credit, its wells must be drilled in an unconsolidated, predominantly sandy aquifer. Wells with a ground water flow path of at least 25 feet will receive 0.5-log credit and at least 50 feet will receive 1.0-log credit. Only horizontal and vertical wells are eligible for this credit. Springs and infiltration galleries are not eligible for treatment credit for bank filtration.

The ground water flow path for vertical wells is the distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary as defined in FEMA flood hazard maps) to the well screen. The ground water flow path for horizontal wells is the distance from the river bed under normal flow conditions to the closest horizontal well lateral screen.

Systems must characterize the aquifer by collecting core samples. Core samples should be collected from the surface to at least the bottom of the well screen. From grain analyses, at least 90 percent of the core length, the recovered core material must contain at least 10 percent fine-grained material (grains less than 1.0 mm diameter).

Bank filtration devices must be monitored for turbidity at least once every 4 hours at the wellhead. The state must receive notification if a system's monthly average exceeds 1 NTU using the daily maximum turbidity values. The state must determine whether previously allowed credit is still appropriate based on the system's assessment identifying the cause of the high turbidity levels in the well.

States may also approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study. The study must meet the following criteria:

- \$ It must follow a state-approved protocol.
- \$ It must involve the collection of data on the removal of *Cryptosporidium* (or a surrogate for *Cryptosporidium*) and related hydrogeologic and water quality parameters during the full range of operating conditions.
- \$ It must include sampling from both the production well and monitoring wells that are screened and located along the shortest flow path between the surface water source and production wells.

### **3.8.6 Combined Filter Performance [40 CFR 141.718(a)]**

States may grant additional *Cryptosporidium* treatment credit to certain plants (e.g., conventional or direct filtration processes) that maintain finished water turbidity at levels significantly lower than previously required (e.g., 0.3 NTU). Conventional and direct filtration plants may receive an additional 0.5-log towards *Cryptosporidium* treatment requirements if the CFE is less than or equal to 0.15 NTU in at least 95 percent of the measurements taken each month for compliance with the SWTR and IESWTR or LT1ESWTR. Compliance with this criterion must be based on turbidity measurements of the CFE every 4 hours (or more frequently) while the plant system serves water to the public. States may not grant this

credit to systems with membrane, bag/cartridge, slow sand, or diatomaceous earth plants, due to the lack of documented correlation between effluent turbidity and *Cryptosporidium* removal in these processes.

### **3.8.7 Individual Filter Performance [40 CFR 141.718(b)]**

States may grant systems with conventional or direct filtration processes 0.5-log *Cryptosporidium* treatment credit (in addition to credit for combined filter performance) if turbidity measurements collected for IESWTR or LT1ESWTR compliance meet the following turbidity criteria: (1) filtered water turbidity less than or equal to 0.15 NTU in at least 95 percent of the 15-minute values recorded at each filter in each month; and (2) no individual filter has a measured turbidity level greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

### **3.8.8 Demonstration of Performance [40 CFR 141.718(c)]**

The state may award treatment credits other than the prescribed treatment credit based on a demonstration of performance study that meets the following criteria:

- \$ The study must follow a state-approved protocol.
- \$ The study must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

Where a system can demonstrate that a plant, or a unit process within a plant, achieves a *Cryptosporidium* removal (or inactivation) efficiency greater than the presumptive credit specified in the LT2ESWTR, it may be appropriate for the state to grant the system a higher *Cryptosporidium* treatment credit. States may award a higher level of *Cryptosporidium* treatment credit to a system where the state determines, based on site-specific testing with a state-approved protocol, that a treatment plant (or a unit process within a plant) reliably achieves a higher level of *Cryptosporidium* removal on a continuing basis.

Alternatively, states may award a lower level of *Cryptosporidium* treatment credit to a system where a state determines, based on site-specific information, that a plant (or a unit process within a plant) achieves a *Cryptosporidium* removal efficiency less than a presumptive credit specified in the LT2ESWTR.

State approval must be in writing. The state may require systems to report operational data on an ongoing basis (e.g., monthly or quarterly) to establish that the conditions under which demonstration of performance credit was awarded are maintained during routine operation. EPA's *LT2ESWTR Toolbox Guidance Manual* describes potential approaches to demonstration of performance testing.

Note that plants receiving *Cryptosporidium* treatment credit through a demonstration of performance are not eligible for the presumptive credit associated with some microbial toolbox components. For example, if a conventional filtration plant receives a demonstration of performance credit of 4.0-log for *Cryptosporidium* removal, the plant may not receive additional presumptive credit for the CFE toolbox option.

### **3.8.9 Bag and Cartridge Filtration [40 CFR 141.719(a)]**

States can grant systems using bag and cartridge filters for secondary filtration (i.e., they have a primary filtration process that meets the SWTR, IESWTR, or LT1ESWTR finished water turbidity requirements) up to 2.0-log *Cryptosporidium* treatment credit for individual filters and up to 2.5-log *Cryptosporidium* treatment credit for filters operated in series. To be eligible for removal credit, the filtration process must be a pressure-driven separation process that removes particulate matter larger than 1 µm using an

engineered porous filtration media through either surface or depth filtration. Removal efficiency must be demonstrated through a challenge test with an applied safety factor conducted on a full-scale bag or cartridge filter.

Challenge testing involves evaluating each bag or cartridge filter for its removal efficiency of *Cryptosporidium* oocysts (or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts). Challenge testing is not required to be site-specific; rather, it is intended to be product-specific. Due to the variability in performance, the LT2ESWTR requires a safety factor of 1.0-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series. States may use their discretion in considering data from challenge studies conducted prior to promulgation of this regulation in lieu of additional testing. Requirements and guidance for conducting challenge studies on bag and cartridge filters are presented in the *LT2ESWTR Toolbox Guidance Manual*.

### **3.8.10 Membrane Filtration [40 CFR 141.719(b)]**

To grant removal credit to systems using membrane filtration, states must ensure that the membrane technology is a pressure- or vacuum-driven separation process in which particulate matter larger than 1 µm is rejected by an engineered barrier, primarily through a size exclusion mechanism. The membrane technology must also allow for routine direct integrity testing while in operation that verifies the removal efficiency demonstrated through challenge testing is being achieved. The definition of membrane filtration includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

Criteria for determining the level of treatment credit for membrane filtration include:

- \$ Challenge testCa test of the membrane's ability to remove introduced *Cryptosporidium* oocysts or surrogates in simulation of operational conditions. Challenge testing is required for specific products and is not intended to be site-specific.
- \$ Direct integrity testCa physical test applied to the membrane unit in order to identify and isolate integrity breaches. Direct integrity testing includes routine testing of each membrane unit that demonstrates removal efficiency equal to or greater than that awarded from the challenge test. Systems must conduct testing at least once per day while in operation (unless the state approves a lesser frequency) and submit a monthly report to the state summarizing all direct integrity test results above the control limit associated with the *Cryptosporidium* removal credit and the corrective action that was taken in each case.
- \$ Indirect integrity monitoringCmonitoring an aspect of filtered water quality that indicates how much particulate matter is removed (e.g., turbidity monitoring, particle monitoring). Indirect integrity monitoring includes continuously monitoring each membrane unit. Since direct integrity testing is continuous, systems are not subject to integrity testing requirements.

The removal efficiency demonstrated during challenge testing establishes the maximum removal credit that a membrane filtration process is eligible to receive, provided this value is less than or equal to the maximum log removal value that can be verified by the direct integrity test. The system may use data from challenge studies conducted prior to promulgation of the LT2ESWTR in lieu of additional testing if the data meet the criteria in the Rule.

Additional requirements and guidance for conducting the three tests to comply with the LT2ESWTR is provided in EPA's *Membrane Filtration Guidance Manual*.

### **3.8.11 Second Stage Filtration [40 CFR 141.719(c)]**

States can grant systems using a second filtration stage an additional 0.5-log *Cryptosporidium* removal credit if the secondary filtration consists of rapid sand, dual media, GAC, or other fine grain media in a separate stage following rapid sand or dual media filtration. A cap, such as GAC, on a single stage of filtration will not qualify for this credit. The first stage of filtration must be preceded by a coagulation step, and both stages must treat 100 percent of the flow.

### **3.8.12 Slow Sand Filters [40 CFR 141.719(d)]**

States can grant systems using slow sand filtration as a *secondary* filtration step following a primary filtration process (e.g., conventional treatment or direct filtration) an additional 2.5-log *Cryptosporidium* treatment credit. There must be no disinfectant residual in the influent water to the slow sand filtration process, and all flow must be treated by both filtration processes to receive credit. Note that this credit differs from the credit for slow sand filtration as a *primary* filtration process, where states can grant plants a *Cryptosporidium* removal credit of 3.0-log for the LT2ESWTR.

While the removal mechanisms that make slow sand filtration effective as a primary filtration process would also be operative when used as a secondary filtration step, EPA has little data on this specific application. The 2.5-log credit for slow sand filtration as a secondary filtration step, in comparison to 3.0-log credit as a primary filtration process, is a conservative measure reflecting greater uncertainty in its effectiveness. In addition, the 2.5-log credit for slow sand filtration as part of the microbial toolbox is consistent with recommendations in the Stage 2 M-DBP Agreement in Principle.

### **3.8.13 Chlorine Dioxide [40 CFR 141.720(b)]**

Inactivation credit for *Cryptosporidium* is dependent on the "CT" achieved on a daily basis. CT is the product of the disinfectant concentration, C (mg/L) and disinfectant contact time, T (minutes). Systems must calculate CT at least once each day, based on measurements of C and T during peak hourly flow, and use the CT values presented in §141.720 and EPA's *LT2ESWTR Toolbox Guidance Manual* to determine log inactivation credit. Systems with several disinfection segments (i.e., a treatment unit process with a measurable disinfectant residual level and a liquid volume) may calculate CT values for each segment and sum those values to obtain a total CT, then use the table in §141.720(b)(1) to calculate the total log inactivation credit.

Alternatively, states may consider CT values other than those specified in the LT2ESWTR if the system can demonstrate, through the use of a state-approved protocol for on-site disinfection challenge studies, that the CT values are adequate to achieve the inactivation required under the LT2ESWTR. EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for conducting a site-specific inactivation study.

### **3.8.14 Ozone [40 CFR 141.720(b)]**

As with chlorine dioxide, the CT values are used to determine the level of *Cryptosporidium* inactivation by ozone disinfection. States should refer to either the rule language or EPA's *LT2ESWTR Toolbox Guidance Manual* for CT values for various log inactivation credits. The *LT2ESWTR Toolbox Guidance Manual* also provides guidance on calculating CT values for different disinfection reactor designs and operations.

States may consider CT values other than those specified in the LT2ESWTR if the system can demonstrate, through the use of a state-approved protocol for on-site disinfection challenge studies, that the CT values are adequate to achieve the inactivation required under the LT2ESWTR. EPA's *LT2ESWTR Toolbox Guidance Manual* provides guidance for conducting a site-specific inactivation study.

### **3.8.15 Ultraviolet Light [40 CFR 141.720(d)]**

States may award credit to systems using UV disinfection processes for inactivation of *Cryptosporidium*, *Giardia*, and viruses. To be eligible for UV disinfection credit, the system must demonstrate a delivered UV dose using the results of a reactor validation test and on-line monitoring. Validation testing must determine a range of operating conditions under which the reactor delivers the required UV dose and can be monitored by the system.

- \$ Operating conditions must include flow rate, UV intensity, and lamp status, at a minimum.
- \$ Validated conditions determined by testing must account for UV absorbance of the water, lamp fouling and aging, measurement uncertainty of on-line sensors, UV dose distributions arising from the velocity profiles through the reactor, failure of UV lamps or other critical system components, and inlet and outlet piping or channel configurations of the UV reactor.

UV reactors may be validated for a specific system or under a wide range of conditions, thus providing disinfection credit for a variety of applications. Monitoring is used to demonstrate that the system maintains validated operating conditions during routine use. Validation testing and on-line monitoring results may be available from the UV technology provider. EPA's *UV Disinfection Guidance Manual* provides a protocol for validating reactors and guidance on the design and implementation of UV systems.

The LT2ESWTR presents the UV doses required to receive credit for up to 3.0-log inactivation of *Cryptosporidium* and *Giardia lamblia* and up to 4.0-log inactivation of viruses. These dose values are for UV light at a wavelength of 254 nm as delivered by a low pressure mercury vapor lamp and intended for post-filter applications of UV in filtration plants and for systems that meet the filtration avoidance criteria. However, the dose values can be applied to other UV applications (e.g., medium pressure mercury vapor lamps), as described in EPA's *UV Disinfection Guidance Manual*.

## **3.9 Oversee Disinfection Profiling and Benchmarking**

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The state should review the system's disinfection profiling data during the sanitary survey process. In addition, when a system plans to make a significant change to their disinfection process, it is required to conduct profiling and must calculate a benchmark. The profile and benchmark must be submitted to the state with an evaluation of how the new process will affect the current benchmark. Significant changes in disinfection practice are defined as: 1) moving the point of disinfection (this is not intended to include routine seasonal changes already approved by the state); 2) changing the type of disinfectant; 3) changing the disinfection process; or 4) making other modifications designated as significant by the state.

### **3.10 Review Changes in Treatment or Control Measures Used to Meet *Cryptosporidium* Treatment Requirements**

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Depending on the toolbox option, systems are required to submit plans, testing data, and monitoring results to ensure the additional treatment is appropriate. System reporting requirements are described for each toolbox option in §141.721, and are included in section 1 of this manual. Systems will also submit documentation supporting any change in their disinfection process. States should develop reporting protocols, review procedures, and follow-up steps to ensure all documentation and reported information is addressed in a timely manner.

### **3.11 Review Covers and Treatment for Uncovered Finished Water Reservoirs**

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Systems must notify the state if they use uncovered reservoirs by April 1, 2008, and cover or treat uncovered finished water reservoirs by April 1, 2009, or be in compliance with an alternative state-approved schedule. The LT2ESWTR requires that systems with uncovered finished water reservoirs must: 1) cover the reservoir; or 2) treat reservoir discharge to the distribution system to achieve a 4.0-log virus, 3.0-log *Giardia*, and 2.0-log *Cryptosporidium* inactivation and/or removal.

### **3.12 Approve Laboratories for Monitoring *Cryptosporidium***

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Given the potentially significant implications in terms of both cost and public health protection of microbial monitoring under the LT2ESWTR, analytical work must be accurate and reliable within the limits of approved methods.

Because states do not currently approve laboratories for *Cryptosporidium* analysis and LT2ESWTR monitoring will begin as early as October 1, 2006, EPA will initially assume responsibility for *Cryptosporidium* laboratory approval. EPA expects, however, that states will include *Cryptosporidium* analysis in their state laboratory certification programs in the future.

EPA established the Laboratory Quality Assurance (QA) Evaluation Program for *Cryptosporidium* analysis to identify laboratories that can meet LT2ESWTR data quality objectives. This is a voluntary program open to laboratories involved in analyzing *Cryptosporidium* in water. Under this program, EPA assesses the ability of laboratories to reliably measure *Cryptosporidium* occurrence with EPA Methods 1622 and 1623 using both performance testing samples and an on-site evaluation. For more information on the program, visit EPA's Web site at [www.epa.gov/safewater/disinfection/lt2/lab\\_home.html](http://www.epa.gov/safewater/disinfection/lt2/lab_home.html).

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## **Section 4**

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# **State Primacy Revision Application**

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40 CFR Part 142 sets out requirements for states to obtain and/or retain primary enforcement responsibility (primacy) for the Public Water System Supervision (PWSS) program as authorized by Section 1413 of the SDWA. The 1996 SDWA Amendments updated the process for states to obtain and/or retain primacy. On April 28, 1998, EPA promulgated the Primacy Rule to reflect these statutory changes (63 *FR* 23361).

## 4.1 State Primacy Program Revision

Pursuant to §142.12, Revision of State Programs, complete and final requests for approval of program revisions to adopt new or revised EPA regulations must be submitted to the EPA Administrator no later than 2 years after promulgation of the new or revised federal regulations (see Table 4-1). Until those applications are approved, EPA Regions have responsibility for directly implementing the LT2ESWTR. The state and EPA can agree to implement the Rule together during this period. However, if a state is eligible for interim primacy, it will have full implementation and enforcement authority. States that have primacy for all existing NPDWRs are considered to have interim primacy for any new or revised regulation. Interim primacy for the LT2ESWTR would begin on the date the final and complete primacy revision application is submitted or the effective date of the new state regulation (whichever is later), and ends when EPA makes a final determination.

A state may be granted an extension of time, up to 2 years, to submit its application package. During any extension period, an extension agreement outlining the state's and EPA's responsibilities is required.

**Table 4-1. State Rule Implementation and Revision Timetable for the LT2ESWTR**

EPA/State Action	Time Frame
Rule published by EPA	January 5, 2006
State and region establish a process and agree upon a schedule for application review and approval (optional)	March 5, 2006
State, at its option, submits <i>draft</i> program revision package to region including: Preliminary Approval Request, Draft State Regulations and/or Statutes, Regulation Crosswalk	July 5, 2006 (Recommended)
Regional (and Headquarters if necessary) review of draft	Completed within 90 days of state submittal of draft (Recommended)
State submits complete and final program revision package to region including: Adopted State Regulations Regulation Crosswalk §142.10 Primacy Update Checklist §142.14 and 142.15 Reporting and Recordkeeping §142.16 Special Primacy Requirements Attorney General's Enforceability Certification	January 5, 2008*
States with approved extensions submit complete and final program revision package	January 5, 2010**

EPA/State Action	Time Frame
EPA final review and determination: Regional Review (program and Office of Regional Counsel (ORC)) Headquarters Concurrence and Waivers (OGWDW) Public Notice Opportunity for Hearing EPA's Determination	Completed within 90 days of state submittal of final package (45 days Region) (45 days Headquarters)***

\* EPA suggests submitting an application by October 5, 2007, to ensure timely approval. EPA regulations allow states until January 5, 2008, for this submittal.

\*\* EPA suggests submitting an application by October 5, 2010 for states with approved extensions to ensure timely approval.

\*\*\* At least one state application per region.

#### 4.1.1 The Revision Process

EPA recommends a two-step process for approval of state program revisions. The steps consist of submission of a draft request (optional) and submission of a complete and final request for program approval. Figure 4-1 diagrams these processes and their timing.

**Draft Request** The state may submit a draft request for EPA review and tentative determination. The request should contain drafts of all required primacy application materials (with the exception of a draft Attorney General's Statement). A draft request should be submitted as soon as practicable; EPA recommends submitting it within 6 months of rule promulgation. EPA will make a tentative determination as to whether the state program meets the applicable requirements. EPA intends to make a tentative determination within 90 days.

**Complete and Final Request** This submission must be in accordance with §142.12(c)(1) and (2) and include the Attorney General's statement. The state should also include its response to any comments or program deficiencies identified in the tentative determination (if applicable). Submission of only a final request may make it more difficult for states to address any necessary changes within the allowable time for state rule adoption.

EPA recommends that states submit their complete and final revision package within 21 months (by October 5, 2008) of rule promulgation. This will ensure that states will have interim primacy as soon as possible and will prevent backlogs of revision applications to adopt future federal requirements.

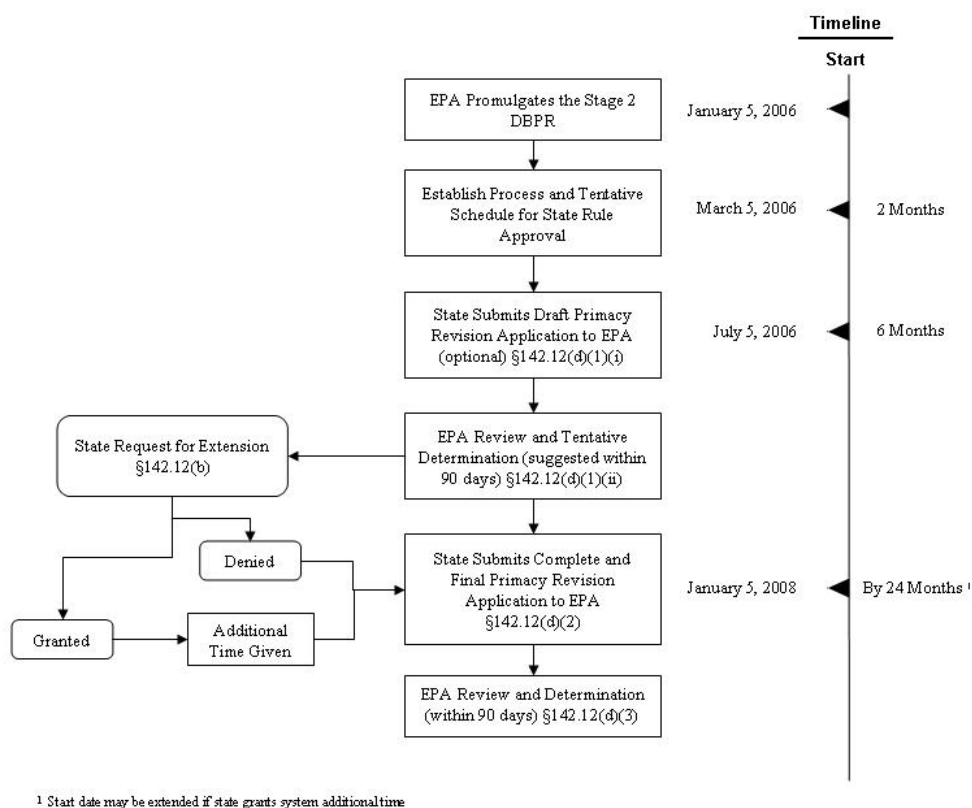
The state and region should agree to a plan and timetable for submitting the state primacy revision application as soon as possible after rule promulgation ideally within 5 months of promulgation.

#### 4.1.2 The Final Review Process

Once a state application is complete and final, EPA has a regulatory (and statutory) deadline of 90 days to review and approve or disapprove the revised program. OGWDW will conduct a detailed concurrent review of the first state package from each region. The regional office should submit its comments with the state's package within 45 days for review by Headquarters (HQ). When the region has identified all significant issues, OGWDW waives concurrence on all other state programs in that region, although EPA HQ retains the option to review additional state programs, as appropriate. The Office of General Counsel (OGC) has delegated its review and approval to the Office of Regional Counsel (ORC).

In order to meet the 90-day deadline for packages undergoing review by HQ, the review period is equally split by giving the regions and HQ 45 days each to conduct their respective reviews. For the first package in each region, regions should forward copies of the primacy revision applications and their evaluations to the Drinking Water Protection Division Director in OGWDW no later than 45 days after state submittal. The Drinking Water Protection Division Director takes the lead on the HQ review process.

**Figure 4-1. Recommended Review Process for State Request for Approval of Program Revisions**



## **4.2 State Primacy Program Revision Extensions**

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### **4.2.1 The Extension Process**

Under §142.12(b), states may request that the 2-year deadline for submitting the complete and final packages for EPA approval of program revisions be extended for up to 2 additional years in certain circumstances. The extension request must be submitted to EPA within 2 years of the date that EPA published the regulation. The Regional Administrator has been delegated authority to approve extension applications. Concurrence by HQ on extensions is not required.

Therefore, the state must either adopt regulations pertaining to the LT2ESWTR and submit a complete and final primacy revision application or request an extension of up to 2 years by January 5, 2008.

### **4.2.2 Extension Request Criteria**

For an extension to be granted under §142.12(b), the state must demonstrate that it is requesting the extension because it cannot meet the original deadline for reasons beyond its control and despite a good faith effort to do so. A critical part of the extension application is the state's proposed schedule for submission of its complete and final request for approval of a revised primacy program. The application must also demonstrate at least one of the following:

- (i) That the state currently lacks the legislative or regulatory authority to enforce the new or revised requirements;
- (ii) That the state currently lacks the program capability adequate to implement the new or revised requirements; or,
- (iii) That the state is requesting the extension to group two or more program revisions in a single legislative or regulatory action.

In addition, the state must be implementing the EPA requirements to be adopted in its program revision within the scope of its current authority and capabilities.

### **4.2.3 Conditions of the Extension**

Until the State Primacy Revision Application has been submitted, the state and EPA regional office will share responsibility for implementing the primary program elements as indicated in the extension agreement. The state and the EPA regional office should discuss these elements and address terms of responsibility in the agreement.

These conditions will be determined during the extension approval process and are decided on a case-by-case basis. The conditions must be included in an extension agreement between the state and the EPA regional office.

Conditions of an extension agreement may include:

- \$ Informing PWSs of the new EPA (and upcoming state) requirements and the fact that the region will be overseeing implementation of the requirements until they approve the state program revisions or until the state submits a complete and final revision package if the state qualifies for interim primacy.

- \$ Collecting, storing, and managing laboratory results, public notices, and other compliance and operation data required by the EPA regulations.
- \$ Assisting the region in the development of the technical aspects of enforcement actions and conducting informal follow-up on violations (e.g., telephone calls, letters).
- \$ Providing technical assistance to PWSs.
- \$ For states whose request for an extension is based on a current lack of program capability adequate to implement the new requirements, taking steps agreed to by the region and the state to remedy the deficiency during the extension period.
- \$ Providing the region with all the information required under §142.15 for state reporting.

Example 4-1 provides a checklist the region can use to review state extensions or to create an extension agreement.

Until states have primacy, EPA is the primacy enforcement authority. However, historically states have played a role in implementation for various reasons—most importantly, since states have the local knowledge and expertise and have established relationships with their systems.

The state and EPA should be viewed as partners in this effort, working toward two very specific public health-related goals. The first goal is to achieve a high level of compliance with the regulation. The second goal is to facilitate efficient co-regulation during the transition period before the state has primacy, including interim primacy, for the Rule. In order to accomplish these goals, education, training, and technical assistance will need to be provided to water suppliers on their responsibilities under the LT2ESWTR.

## Example 4-1. Example Extension Request Checklist

{Date}

{Regional Administrator}

Regional Administrator

U.S. EPA Region {Region}

{Street Address}

{City, State, Zip}

RE: Request/approval for an Extension Agreement

Dear {Regional Administrator}:

The State of {State} is requesting an extension to the date that the final primacy revisions are due to EPA for the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) until {insert date - no later than January 5, 2010}, as allowed by 40 CFR 142.12 and would appreciate your approval. Staff of the {State Department/Agency} have conferred with your staff and have agreed to the requirements listed below for this extension. This extension is being requested because the State of {State}:

- ☐ Is planning to group two or more program revisions into a single legislative or regulatory action.
- ☐ Currently lacks the legislative or regulatory authority to enforce the new or revised requirements.
- ☐ Currently lacks adequate program capability to implement the new or revised requirements.

{State Department/Agency} will be working with EPA to implement the LT2ESWTR within the scope of its current authority and capability, as outlined in the six areas identified in §142.12(b)(3)(i-vi):

i) Informing PWSs of the new EPA (and upcoming state) requirements and the fact that EPA will be overseeing implementation of the requirements until EPA approves the state revision.

State	EPA	
_____	_____	Provide copies of regulation and guidance to other state agencies, public water systems (PWSs), technical assistance providers, associations, or other interested parties.
_____	_____	Educate and coordinate with state staff, PWSs, the public, and other water associations about the requirements of this regulation.
_____	_____	Notify affected systems of their requirements under the LT2ESWTR.
_____	_____	Other:

ii) Collecting, storing and managing laboratory results, public notices, and other compliance and operation data required by the EPA regulations.

State	EPA	
_____	_____	Devise a tracking system for PWS reporting pursuant to the LT2ESWTR.
_____	_____	Keep PWSs informed of SDWIS reporting requirements during development and implementation.
_____	_____	Report LT2ESWTR violation and enforcement information to SDWIS as required.
_____	_____	Other:

iii) Assisting EPA in the development of the technical aspects of the enforcement actions and conducting informal follow-up and violations (telephones calls, letters, etc.).

State	EPA	
_____	_____	Issue notices of violation (NOVs) for treatment technique, MCL, and monitoring/reporting violations of the LT2ESWTR.



\_\_\_\_\_ Provide immediate technical assistance to PWSs with treatment technique, MCL, and/or monitoring/reporting violations to try to bring them into compliance.  
 \_\_\_\_\_ Refer all violations to EPA for enforcement if they have not been resolved within 60 days of the incident that triggered the violation. Provide information as requested to conduct and complete any enforcement action referred to EPA.  
 \_\_\_\_\_ Other:

iv) Providing technical assistance to PWSs.

State	EPA	
_____	_____	Conduct training within the state for PWSs on LT2ESWTR requirements.
_____	_____	Provide technical assistance through written and/or verbal correspondence with PWSs.
_____	_____	Provide on-site technical assistance to PWSs as requested and needed to ensure compliance with this regulation.
_____	_____	Coordinate with other technical assistance providers and organizations to provide accurate information and aid in a timely manner.
_____	_____	Other:

v) Providing EPA with all information prescribed by the State Reporting Requirements in §142.15.

State	EPA	
_____	_____	Report any violations incurred by PWSs for this regulation each quarter.
_____	_____	Report any enforcement actions taken against PWSs for this regulation each quarter.
_____	_____	Report any variances or exemptions granted for PWSs for this regulation each quarter.
_____	_____	Other:

vi) For states whose request for an extension is based on a current lack of program capability to implement the new or revised requirements, taking the following steps to remedy the capability deficiency.

State	EPA	
_____	_____	Acquire additional resources to implement these regulations (list of specific steps being taken attached as <u><b>{List A}</b></u> ).
_____	_____	Provide quarterly updates describing the status of acquiring additional resources.
_____	_____	Other:

I affirm that the **{State Department/Agency}** will implement provisions of the LT2ESWTR as outlined above

\_\_\_\_\_  
**{Agency Director or Secretary}** Date

\_\_\_\_\_  
**{Name of State Agency}**

I have consulted with my staff and approve your extension for the aforementioned regulation. I affirm that EPA Region **{Region}** will implement provisions of the LT2ESWTR as outlined above.

\_\_\_\_\_  
 Regional Administrator Date  
 EPA Region **{Region}**

This Extension Agreement will take effect upon the date of the last signature.

## 4.3 State Primacy Package

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The Primacy Revision Application package should consist of the following sections:

- ☐ State Primacy Revision Checklist
- ☐ Text of the State's Regulation
- ☐ Primacy Revision Crosswalk
- ☐ State Reporting and Recordkeeping Checklist
- ☐ Special Primacy Requirements
- ☐ Attorney General's Statement of Enforceability

### 4.3.1 The State Primacy Revision Checklist

This section is a checklist of general primacy requirements, as shown in Table 4-2. In completing this checklist, the state must identify the program elements that it has revised in response to new federal requirements. **If an element has been revised, the state should indicate a “Yes” answer in the “Revision to State Program” column and should submit appropriate documentation.** For elements that did not require revision, the state need only list the citation and date of adoption in the “Revision to State Program” column. During the application review process, EPA will insert findings and comments in the final column.

The 1996 SDWA Amendments include new provisions for PWS definition and administrative penalty authority. States must adopt provisions at least as stringent as these new provisions, now codified at §142.2 and 142.10. Failure to revise these elements can affect primacy for the LT2ESWTR.

States may bundle the primacy revision packages for multiple rules. If states choose to bundle requirements, the Attorney General's Statement should reference all of the rules included.

### 4.3.2 Text of the State's Regulation

Each primacy application package should include the text of the state regulation.

### 4.3.3 Primacy Revision Crosswalk

The Primacy Revision Crosswalk, in Appendix A, should be completed by states in order to identify state statutory or regulatory provisions that correspond to each federal requirement. If the state's provisions differ from federal requirements, the state should explain how its requirements are no less stringent.

**Table 4-2. State Primacy Revision Checklist**

Required Program Elements		Revision to State Program	EPA Findings/Comments
§ 141.2	Definitions		
§ 142.10(b)(6)(iii)	Right of entry		
§ 142.10(b)(6)(iv)	Authority to require records		
§ 142.10(b)(6)(v)	Authority to require public notification		
§ 142.10(b)(6)(vi)	Authority to assess civil and criminal penalties		
§ 142.10(b)(6)(vii)	Authority to require CCRs		
§ 142.10(c)	Maintenance of records		
§ 142.10(d)	Variance/exemption conditions (if applicable)*		
§ 142.10(e)	Emergency plans		
§ 142.10(f)	Administrative Penalty Authority**		

\* Regulations published in the August 14, 1998 *Federal Register*.

\*\* Requirement from the 1996 Amendments. Regulations published in the April 28, 1998 *Federal Register*.

#### **4.3.4 State Recordkeeping and Reporting Checklist [40 CFR 142.14, 40 CFR 142.15]**

The LT2ESTWR adds state reporting and state recordkeeping requirements. The state should use the Primacy Revision Crosswalk in Appendix A to demonstrate that state reporting and recordkeeping requirements are consistent with federal requirements. If state requirements are not the same as federal requirements, the state must explain how its requirements are “no less stringent” as per § 142.10. States may want to include in their State Primacy Revision Application how long the state will keep the records and in what format the data will be kept.

The Primacy Revision Crosswalk includes state recordkeeping and reporting requirements indicating that the state must:

- \$ Keep records of the results of *E. coli* and *Cryptosporidium* monitoring.
- \$ Keep records of the *Cryptosporidium* bin classification for each filtered system, including any changes to initial bin classification based on watershed survey or second round of monitoring.
- \$ Keep records of the determination of whether each unfiltered system has a mean source water *Cryptosporidium* level above 0.01 oocysts/L, along with any changes in this determination due to the second round of source water monitoring.
- \$ Keep records of the treatment processes or control measures that each system employs to meet their *Cryptosporidium* treatment requirements.
- \$ Keep a list of systems required to cover or treat the effluent of an uncovered finished water reservoir.

- \$ Report to EPA the initial bin classification for each system and any changes in bin classifications due to watershed assessment during sanitary surveys or the second round of *Cryptosporidium* monitoring.
- \$ Report to EPA the determination of whether each unfiltered system meeting filtration avoidance criteria has a mean source water *Cryptosporidium* level above 0.01 oocysts/L, along with any changes in this determination due to the second round of source water monitoring.

#### **4.3.5 Special Primacy Requirement [40 CFR 142.16]**

The Special Primacy Requirements section of the crosswalk is where the state has the opportunity to describe how it will satisfy these provisions. Special primacy conditions pertain to specific regulations where implementation of the rule involves activities beyond general primacy provisions. States must include these rule-distinct provisions in an application for approval or revision of their program. Section 4.4 provides guidance on how states may choose to meet the special primacy requirements of the LT2ESWTR.

#### **4.3.6 Attorney General's Statement of Enforceability [40 CFR 142.12(c)(2)]**

The complete and final primacy revision application must include an Attorney General's Statement certifying that the state regulations were duly adopted and are enforceable (unless EPA has waived this requirement by letter to the state). The Attorney General's Statement should also certify that the state does not have any audit privilege or immunity laws, or if it has such laws, that these laws do not prevent the state from meeting the requirements of the SDWA. If a state has submitted this certification with a previous revision package, then the state should indicate the date of submittal and the Attorney General need only certify that the status of the audit laws has not changed since the prior submittal. An example of an Attorney General's Statement is presented in Example 4-2.

##### **4.3.6.1 Guidance for States on Audit Privilege and/or Immunity Laws**

In order for EPA to properly evaluate the state's request for approval, the State Attorney General or independent legal counsel should certify that the state's environmental audit immunity and/or privilege and immunity law does not affect its ability to meet enforcement and information gathering requirements under SDWA. This certification should be reasonably consistent with the wording of the state audit laws and should demonstrate how state program approval criteria are satisfied.

EPA will apply the criteria outlined in its "Statement of Principles" memo issued on February 14, 1997, ([www.epa.gov/epaoswer/hazwaste/state/policy/policies.htm](http://www.epa.gov/epaoswer/hazwaste/state/policy/policies.htm)) to determine whether states with audit laws have retained adequate enforcement authority for any authorized federal programs. The principles articulated in the guidance are based on the requirements of federal law, specifically the enforcement and compliance and state program approval provisions of environmental statutes and their corresponding regulations. The Principles provide that if provisions of state law are ambiguous, it will be important to obtain opinions from the State Attorney General or independent legal counsel interpreting the law as meeting specific federal requirements. If the law cannot be so interpreted, changes to state laws may be necessary to obtain federal program approval. Before submitting a package for approval, states with audit privilege and/or immunity laws should initiate communications with appropriate EPA regional offices to identify and discuss the issues raised by the state's audit privilege and/or immunity law.

The guidance for states on Audit Law Privilege and/or Immunity Laws is currently under review. If amended, EPA will issue an addendum to this document with the revised guidance.

#### **Example 4-2. Example of Attorney General's Statement**

##### ***Model Language***

I hereby certify, pursuant to my authority as (1) and in accordance with the Safe Drinking Water Act as amended, and (2), that in my opinion the laws of the [State/Commonwealth of (3)] [or tribal ordinances of (4)] to carry out the program set forth in the "Program Description" submitted by the (5) have been duly adopted and are enforceable. The specific authorities provided are contained in statutes or regulations that are lawfully adopted at the time this Statement is approved and signed and will be fully effective by the time the program is approved.

**I. For States with No Audit Privilege and/or Immunity Laws**

Furthermore, I certify that [State/Commonwealth of (3)] has not enacted any environmental audit privilege and/or immunity laws.

**II. For States with Audit Laws that do Not Apply to the State Agency Administering the Safe Drinking Water Act**

Furthermore, I certify that the environmental [audit privilege and/or immunity law] of the [State/Commonwealth of (3)] does not affect the ability of (3) to meet enforcement and information gathering requirements under the Safe Drinking Water Act because the [audit privilege and/or immunity law] does not apply to the program set forth in the "Program Description." The Safe Drinking Water Act program set forth in the "Program Description" is administered by (5); the [audit privilege and/or immunity law] does not affect programs implemented by (5), thus the program set forth in the "Program Description" is unaffected by the provisions of [State/Commonwealth of (3)] [audit privilege and/or immunity law].

**III. For States with Audit Privilege and/or Immunity Laws that Worked with EPA to Satisfy Requirements for Federally Authorized, Delegated, or Approved Environmental Programs**

Furthermore, I certify that the environmental [audit privilege and/or immunity law] of the [State/Commonwealth of (3)] does not affect the ability of (3) to meet enforcement and information gathering requirements under the Safe Drinking Water Act because [State/Commonwealth of (3)] has enacted statutory revisions and/or issued a clarifying Attorney General's Statement to satisfy requirements for federally authorized, delegated, or approved environmental programs.

Seal of Office

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Name and Title

\_\_\_\_\_  
Date

- (1) State Attorney General or attorney for the primacy agency if it has independent legal counsel.  
(2) 40 CFR 142.11(a)(6)(i) for initial primacy applications or 40 CFR 142.12(c)(1)(iii) for primacy program revision applications.  
(3) Name of state or commonwealth.  
(4) Name of tribe.  
(5) Name of primacy agency.

## 4.4 Guidance for the Special Primacy Requirements of the LT2ESWTR

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To ensure that a state program includes all the elements necessary for an effective and enforceable program under the LT2ESWTR, a state primacy application must include a description of how the state will accomplish the following:

- \$ Approve an alternative to *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people.
- \$ Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.
- \$ Approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.
- \$ Approve protocols for removal credits under the demonstration of performance toolbox option and for alternative ozone and chlorine dioxide values.
- \$ Approve an alternative approach to UV reactor validation testing in the microbial toolbox.

This section contains information and guidance that states can use when addressing these special primacy requirements of the LT2ESWTR. The guidance addresses special primacy conditions in the same order that they occur in the Rule. Additional information related to these requirements is available in EPA's *LT2ESWTR Toolbox Guidance Manual*.

### 4.4.1 Establishment of Alternative to *E. coli* Levels that Trigger *Cryptosporidium* Monitoring

*§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 1) Approve an alternative to the *E. coli* levels that trigger *Cryptosporidium* monitoring by filtered systems serving fewer than 10,000 people.*

#### *Guidance*

To reduce the monitoring burden for small filtered systems, the LT2ESWTR includes a 2-phase monitoring strategy for small systems. This approach is based on ICR and Information Collection Rule Supplemental Surveys (ICRSS) data indicating that systems with low source water *E. coli* levels are likely to have low *Cryptosporidium* levels. Under this approach, small filtered systems must initially sample for *E. coli* beginning October 1, 2008 (unless they elect to monitor for *Cryptosporidium*), and, if results are above the trigger levels (see section 1.2.2), conduct *Cryptosporidium* monitoring.

As recommended by the Stage 2 M-DBP Advisory Committee, EPA will evaluate *Cryptosporidium* indicator relationships in the LT2ESWTR monitoring data collected by large systems. If these data support the use of different indicator levels to trigger small system *Cryptosporidium* monitoring, EPA will issue guidance with recommendations.

Under the LT2ESWTR, states may also approve source water monitoring for filtered systems serving fewer than 10,000 people using an indicator other than *E. coli*. It also allows states to approve alternatives to the threshold annual mean *E. coli* concentrations provided in §141.701(a)(4)(i), (ii), and (v) that trigger source water *Cryptosporidium* monitoring for filtered systems serving fewer than 10,000 people. When approving an alternative, the state must include in its approval the basis for its determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a water system will exceed the Bin 1 *Cryptosporidium* level (0.075 oocyst/L) than the applicable *E. coli* trigger value in the rule (i.e., 10 *E. coli*/100 mL for systems using lake/reservoir sources; 50 *E. coli*/100 mL for systems using flowing stream sources).

The LT2ESWTR requires all filtered systems serving 10,000 people or more to begin source water monitoring at least 18 months before filtered water systems serving fewer than 10,000 people. Systems serving 10,000 people or more will be required to sample for *Cryptosporidium*, *E. coli* and turbidity. The *E. coli* and turbidity data collected by the larger systems will be used by EPA to confirm or, if necessary, refine the use of *E. coli* and turbidity as indicators for monitoring by filtered systems serving fewer than 10,000 people. The EPA will review the indicator data collected by the larger systems and, if appropriate, issue guidance to states on alternative triggers. This guidance may be issued prior to when filtered systems serving fewer than 10,000 people are required to begin monitoring.

States intending to approve alternative indicators or alternative *E. coli* trigger concentrations must describe in their primacy application how they will decide whether the alternative indicator or trigger value is an effective indicator of *Cryptosporidium* contamination. States should consider any additional EPA guidance on alternative indicators and triggers, developed using the indicator data collected by the larger systems, when reviewing alternative approaches to indicator monitoring. States should also consider the most recent peer-reviewed research on the relationships between *Cryptosporidium* surface water concentrations and indicator parameters.

#### **4.4.2 Assessment of Significant Changes in Watershed and Source Water**

*§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 2) Assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.*

##### *Guidance*

States must conduct sanitary surveys for all surface water and GWUDI systems that assess the condition of eight primary water system components, including the source water [§142.10(b)(2) and 142.16(b)]. §142.16(n)(1) requires states to “assess significant changes in the watershed and source water as part of the sanitary survey process and determine appropriate follow-up action.” Examples of significant changes are new point source discharges, new non-point source discharges, and changes to land use such as land development changes in farming and logging practices.

During a sanitary survey, the state must assess whether significant changes have occurred in the watershed since the system conducted source water monitoring for bin classification that could lead to increased contamination of the source water. In cases where a significant change has occurred, states must decide whether corrective measures or additional treatment are needed and determine appropriate follow-up action. States should first require that corrective measures be taken to address the source of

contamination. Where this is not feasible or not successful, states may reclassify the system into a higher treatment bin. If a system is re-classified as the result of the sanitary survey, states must report the re-classification to EPA [§142.15].

This section of the guidance discusses three components of the watershed and source water assessment process: preparing for the sanitary survey, conducting the survey, and determining follow-up action.

#### Preparation for the Survey

The following aspects of source water protection are discussed in the EPA guidance documents *Guidance Manual for Conducting Sanitary Surveys of PWSs*; *Surface Water and Ground Water Under the Direct Influence (GWUDI)* and *State Source Water Assessment and Protection Programs Guidance*. The state or state-approved surveyor may wish to review or address these items before conducting a sanitary survey of a watershed:

- \$ The state source water delineation and assessment for the watershed.
- \$ Historical and current raw water quality records, particularly microbial analyses.
- \$ Water system drawings and design information.
- \$ Water quality violation history.
- \$ Previous sanitary survey reports.
- \$ Complaints received by local, state, and federal agencies regarding water quality or potential contamination within the watershed.
- \$ Updates from local, state, or federal regulatory agencies regarding their monitoring of permitted discharges within the relevant watershed(s) (e.g., National Pollutant Discharge Elimination System (NPDES) and Total Maximum Daily Loads (TMDL) programs).
- \$ Updates from state and federal land-management agencies regarding their monitoring of on-going activities within the relevant watershed(s).
- \$ Where applicable, states may also wish to request that the system personnel that were involved in preparation of a watershed control plan accompany the surveyor during the survey.

Where available, the inspector should also review the following information from unfiltered systems or from filtered systems that receive 0.5-log *Cryptosporidium* removal credit for watershed control under the LT2ESWTR:

- \$ The system's watershed control plan.
- \$ The annual watershed control program status reports submitted by the system, where applicable (systems that have received 0.5-log *Cryptosporidium* credit for watershed control under the LT2ESWTR must submit an annual report).

Copies of relevant information should be taken along during the survey for on-site review and comparison to existing conditions. Potential changes in the watershed or source water conditions that are identified



from these references should then be evaluated during the survey. States may wish to require that their surveyors take specific equipment (e.g., cameras/camcorders, sampling/analysis equipment, and GPS devices) to document the status of potential threats to water quality. Chapter 2 of the *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* contains a more detailed list of equipment.

### Evaluation During the Survey

Chapter 3 of the *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* discusses the source component of a sanitary survey. The following topics are addressed:

- \$ Watershed management program.
- \$ Source vulnerability assessment.
- \$ Source water quality.
- \$ Source water quantity.
- \$ Location of source facilities.
- \$ Capacity of source facilities.
- \$ Design of source facilities.
- \$ Condition of source facilities.
- \$ Transmission of source water.

Also, Chapter 2 of EPA's *LT2ESWTR Toolbox Guidance Manual* provides recommendations for implementing the watershed sanitary survey required by the §141.725(a)(4)(ii) and suggests activities to complete during the survey. While these recommendations were developed for systems that have an approved watershed control plan for supplemental *Cryptosporidium* treatment credit, they also address several issues that should be considered when evaluating watersheds.

- \$ Review the effectiveness of the watershed control program to date. (For example, have water quality monitoring results indicated a change in water quality?)
- \$ Identify any new significant actual or potential sources of *Cryptosporidium*.
- \$ Verify and re-evaluate the applicability of the area of influence, potential and existing sources of *Cryptosporidium*, monitoring locations and results, and the implementation of control measures.
- \$ Verify that the system has control and practices such control over watershed areas and activities as described in the watershed protection plan.
- \$ Confirm that public access is properly restricted from areas identified in the watershed control plan. Review the means by which the system monitors and enforces restrictions.
- \$ Confirm that fencing and signs have not been vandalized or removed.
- \$ Identify any significant hydrological changes in the watershed that could affect *Cryptosporidium* loading.
- \$ Inspect the intake structure and identify any modifications to its location or design.

Finally, existing vulnerabilities and elements of watershed control plans that require on-going efforts by the system should be evaluated during the survey. High-risk sources should be assessed and discussed with system staff. Site visits to the more critical sources may be appropriate. Development patterns should be reviewed because urban and suburban growth is difficult to control in some areas. Water quality control measures that rely upon “gentlemen’s agreements,” public education, or even best-management practices are often difficult to enforce and should be reviewed for adequacy. Because funding for such efforts is often reduced during tight budgetary conditions, the surveyor may wish to assess such efforts if they are a significant component of watershed protection. The surveyor should also assess whether the system is regularly evaluating the effectiveness of its watershed control program (if one has been implemented).

### Follow-up Action

States should also develop criteria for assessing whether changes within watersheds require corrective measures by the systems. Certain changes *may* warrant immediate action (i.e., changes that can have an immediate impact upon water quality). Examples of those warranting immediate action include:

- \$ Inadequate implementation of best management practices.
- \$ NPDES permit violations at wastewater treatment plants, confined animal feedlot operations, etc.
- \$ Dramatic natural events (floods, forest fires, earthquakes, ice flows, landslides) can transport or expose contaminants (e.g., fine-grained sediments, mining wastes, animal and septic system wastes).
- \$ Prolonged drought conditions may warrant special preparatory measures to minimize impacts from waste accumulations that are washed into source waters when precipitation returns.
- \$ Lack of a current emergency response plan.
- \$ Accidental or illegal waste discharges and spills.

Other changes may not result in immediate impacts, but may still warrant corrective measures to minimize long-term impacts. Examples include the following:

- \$ New NPDES permits or changes in existing NPDES permits that involve increased loading of contaminants.
- \$ Changes in land use patterns.
- \$ Changes in agricultural cropping, chemical application, or irrigation practices.
- \$ Unattended soil erosion.
- \$ Changes in other non-point discharge source activities (e.g., grazing, manure application, commercial or residential development).

- \$ Stream or riverbed modifications.
- \$ A watershed public education program that no longer receives adequate funding and/or that has poor stakeholder participation.

As discussed earlier, corrective measures should generally be progressive in nature. In any case, states should have the authority to require corrective measures, and to enforce all original and subsequent conditions of watershed protection. Where land in the watershed is publicly owned, state or federal land-management agencies can often help states and systems to implement corrective actions.

Following is a discussion of appropriate follow-up actions from the *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)*.

“Deficiencies of a minor nature may require no more response than to notify the system operator of the violation and set a time frame for the operator to correct the situation. A moderate deficiency could prompt the state to require the operator to respond within 30 days with a proposed solution to the deficiency and a schedule for correcting the situation. For significant deficiencies, the state must immediately inform the system operator of the deficiency. In some cases, the deficiency may be such that a boil water notice must be issued to the customers in order to protect public health. In all cases, the state should indicate the required time frame for a response, the required action for the response, and the consequences of failing to respond. The consequences could include revocation of the operating permit, suspension of the permit until the deficiency is corrected, and fines or penalties levied against the system operator. When significant deficiencies exist, a consent agreement, administrative order, or litigation by the appropriate court may be necessary to ensure prompt and proper correction. The state should make regular and continued inspections of the facility until all deficiencies have been corrected . . .

The system operator, upon receipt of the sanitary survey report, should prepare a response to the state addressing the survey findings which may include deficiencies of varying degrees of severity. The water system’s response should be returned to the state within 45 days, and must be returned within the 45-day timeframe when the sanitary survey findings include significant deficiencies.”

EPA’s *Guidance Manual for Conducting Sanitary Surveys of PWSs; Surface Water and Ground Water Under the Direct Influence (GWUDI)* discusses all aspects of sanitary surveys from survey preparation through follow-up compliance activities. In particular, the manual discusses source water vulnerability, protection, quality, and quantity and evaluation of infrastructure, including the location, design, capacity and condition of critical source water collection facilities. Citations and locations of this manual and other helpful references are listed below.

#### *References for more detailed guidance*

1. *LT2ESWTR Toolbox Guidance Manual*. USEPA, N.d.e. Forthcoming. ([www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2))
2. *Guidance Manual for Conducting Sanitary Surveys of Public Water Systems; Surface Water and Ground Water Under the Direct Influence (GWUDI)*. USEPA, 1999. EPA 815-R-99-016. ([www.epa.gov/safewater/mdbp/pdf/sansurv/sansurv.pdf](http://www.epa.gov/safewater/mdbp/pdf/sansurv/sansurv.pdf))

3. Watershed Sanitary Survey Guidance Manual. Cal-Nevada Section AWWA, 1993. ([www.ca-nv-awwa.org/](http://www.ca-nv-awwa.org/))
4. *State Source Water Assessment and Protection Programs Guidance*. USEPA, 1997. EPA 816-R-97-009. ([www.epa.gov/safewater/source/swpguid.html](http://www.epa.gov/safewater/source/swpguid.html))

#### 4.4.3 Approval of Watershed Control Programs

*§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 3) Approve watershed control programs for the 0.5-log watershed control program credit in the microbial toolbox.*

##### *Guidance*

Filtered systems that develop a state-approved watershed control program designed to reduce the level of *Cryptosporidium* in the watershed can receive a 0.5-log credit towards the *Cryptosporidium* treatment requirement of LT2ESWTR. EPA has specified the elements that must be included in a watershed control program to obtain this credit. The required elements are found in §141.716(a) and are briefly described below:

- \$ An analysis of *Cryptosporidium* vulnerability, including characterization of watershed hydrology, identification of the area of influence to be considered in future watershed surveys, identification of both potential and actual sources of *Cryptosporidium* contamination, and an assessment of the relative impact of the sources of *Cryptosporidium* on the system's source water, and an estimate of the seasonal variability of the contamination.
- \$ An analysis of control measures that could mitigate contamination.
- \$ A plan that establishes goals and defines and prioritizes specific actions to reduce source water *Cryptosporidium*. The plan must explain expectations, partners and their roles, resource requirements and commitments, and provide a schedule for plan implementation.

Systems must notify the state of their intent to develop a watershed control program. Notification must occur no later than 2 years before the systems' treatment compliance date listed in §141.713(c). Systems must submit a proposed initial watershed control plan and a request for plan approval. The proposal is due no later than 1 year before the systems' treatment compliance date. If the state does not respond to a system regarding approval of the watershed control program and it meets the necessary requirements, it will be considered approved. However, the state may subsequently withdraw the approval.

To meet this special primacy requirement, states must provide a description of how they will approve a watershed control program for the 0.5-log credit. A key element of the approval should be that the system provides to the state sufficient information to indicate at least 0.5-log reduction of the source water *Cryptosporidium* concentration is feasible through implementation of the watershed control program. If a watershed program is already in place, the description must include any additional measures that will be implemented to reduce source water contamination. The description of the state's approach to this

approval process should include the elements of the review process, resources, as well as criteria for granting approval.

Chapter 2 of EPA's *LT2ESWTR Toolbox Guidance Manual* provides information intended to assist systems in developing their watershed control programs and to assist states in assessing these programs. The chapter includes case studies on successful programs, system steps in applying for approval, required components of the program, and suggestions for maintenance of the program. The guidance addresses assessments of plans by the state, including an extensive checklist containing potential assessment criteria that will help states review systems' watershed control plans (Table 2.1 in the *LT2ESWTR Toolbox Guidance Manual*) and evaluations of annual status reports. The guidance also includes suggested components of a watershed sanitary survey. An adequate response to this special primacy requirement could include reference to the use of this guidance document for evaluating and approving proposed plans.

In addition to the *LT2ESWTR Toolbox Guidance Manual*, states may utilize EPA's new Watershed Initiative to help formulate effective watershed control programs. The Watershed Initiative was conceived to encourage successful community-based approaches to restore, preserve, and protect the nation's watersheds. This is a competitive grant program that provides funding to watershed organizations to encourage the protection and restoration of water resources. EPA plans to select up to 20 watersheds throughout the country for grants to support promising watershed-based approaches to improving water quality. More information on the program as well as criteria for nomination materials and the process for applying for these grant monies are available through the Watershed Initiative Web site indicated below.

EPA is developing a strategy for Waterborne Microbial Disease Control. Objectives of the strategy are to address all important sources of contamination, anticipate emerging problems, and use program and research activities to unite the influences of both the SDWA and the Clean Water Act on microbial contamination of the nation's waters. A presentation titled, "Developing a Strategy for Waterborne Microbial Disease Control," from the November 6, 2001, Waterborne Microbial Disease Stakeholder Meeting is available at the Web site provided below.

#### *References for more detailed guidance*

1. *LT2ESWTR Toolbox Guidance Manual*. USEPA, N.d.e. Forthcoming.  
([www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2))
2. EPA Watershed Initiative, as proposed in 67 *FR* 36172, January 15, 2002.  
([www.epa.gov/owow/wtr1/watershed/initiative/background.html](http://www.epa.gov/owow/wtr1/watershed/initiative/background.html))
3. *Developing a Strategy for Waterborne Microbial Disease Control*. USEPA, 2002.  
([www.epa.gov/ost/humanhealth/microbial/proceedings/strategy/](http://www.epa.gov/ost/humanhealth/microbial/proceedings/strategy/))

#### **4.4.4 Establishment of Protocols for Approving Removal Credits Under the Demonstration of Performance Toolbox Option**

*§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 4) Approve protocols for demonstration of performance treatment credits in the microbial toolbox.*

## Guidance

As discussed in detail in section 3.8.8, when a system can demonstrate that a plant (or a unit process within a plant) achieves a *Cryptosporidium* removal efficiency greater than the presumptive credit specified in the §141.711 and §§141.715 through 141.719 the system may be able to receive a higher *Cryptosporidium* treatment credit based on site-specific testing with a state-approved protocol. The treatment plant (or a unit process within a plant) must reliably achieve a higher level of *Cryptosporidium* removal on a continuing basis. States may also award a lower level of *Cryptosporidium* treatment credit to a system if the state determines, based on site-specific information, that a plant or a unit process within a plant achieves a *Cryptosporidium* removal efficiency less than a presumptive credit specified in the LT2ESWTR.

The demonstration of performance toolbox option applies to physical treatment processes including presedimentation, coagulation/flocculation, sedimentation, filtration (including bank filtration and secondary filtration), and two-stage softening. Treatment credit for disinfection processes is based on system performance (i.e., CT values).

Since demonstration of performance applies to physical removal processes at a treatment plant, systems may not claim credit for the toolbox options listed below if that component is included in the demonstration of performance credit.

- \$ Presedimentation
- \$ Two-stage lime softening
- \$ Bank filtration
- \$ Combined or individual filter performance
- \$ Membrane filters
- \$ Bag and cartridge filters
- \$ Second stage filtration

Additionally, some treatment options may enhance *Cryptosporidium* treatment while reducing the effectiveness of other aspects of treatment. For example, under certain circumstances, changes in the coagulation, flocculation, and/or sedimentation processes that result in better sedimentation performance may interfere with effective performance of the filters causing short filter runs or reduced filter removal efficiency. The resulting overall performance of the plant may not be an improvement over the presumptive credit. Therefore, systems and states should carefully evaluate the overall treatment process in addition to the portion addressed in the demonstration of performance.

States must establish criteria for determining how additional credits will be granted. States also have the authority to request additional information not specified by the Rule to document that systems are in compliance [§141.718(c)(3)]. The demonstration of performance process for microbial treatment is discussed in Chapter 12 of the *LT2ESWTR Toolbox Guidance Manual*. Chapter 12 discusses critical aspects of developing and administering a demonstration of performance process, including criteria development and evaluation, testing protocol, monitoring, and reporting. States are encouraged to use the manual in preparing their demonstration of performance program and primacy revision applications.

Systems serving 10,000 people or more must report the results of their demonstration of performance testing to the primacy agency by April 1, 2012, October 1, 2012, or October 1, 2013 (depending on system size). Systems serving fewer than 10,000 people must report the results of their demonstration of performance testing to the primacy agency by October 1, 2014. If states are interested in this demonstration of performance toolbox option, state primacy regulations should be developed, reviewed, and approved in advance of these deadlines to allow systems adequate time to pursue the option.

*References for more detailed guidance*

1. *LT2ESWTR Toolbox Guidance Manual*. USEPA, N.d.e. Forthcoming.  
([www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2))

#### **4.4.5 Establishment of Protocols for Approving Alternative Ozone and Chlorine Dioxide CT Values**

*§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 5) Approve protocols for alternative ozone and chlorine dioxide CT values in the microbial toolbox.*

##### *Guidance*

Systems that use chlorine dioxide or ozone may receive inactivation credit under LT2ESWTR based on CT values. To receive treatment credit, systems must measure the water temperature, disinfectant contact time, and residual disinfectant concentration at least once each day and determine the log inactivation credit using the CT Tables in §141.720(b). Specific criteria are as follows:

- \$ The temperature of the disinfected water must be measured at least once per day at each residual disinfectant concentration sampling point.
- \$ The disinfectant contact time (T) must be determined for each day during peak hourly flow.
- \$ The residual disinfectant concentration (C) of the water before or at the first customer must be measured each day during peak hourly flow.
- \$ The CT Tables in §141.720(b) are used to determine *Cryptosporidium* log inactivation credit based on the water temperature and the product of disinfectant concentration and CT.

The LT2ESWTR allows states to approve alternative CT values for chlorine dioxide and ozone on a site-specific basis [§141.720]. Inactivation rates may be sensitive to water quality and operational conditions at individual systems. Therefore, states may allow systems to perform a site-specific inactivation study to generate CT tables specific to their facility. The study would involve measuring actual *Cryptosporidium* inactivation performance under site conditions. If accepted by the state, the system would then be required to meet the CT values established in the site-specific inactivation study and maintain the operating conditions used in the site-specific study. Guidance on site-specific studies is provided in Appendix A of the *LT2ESWTR Toolbox Guidance Manual*.

States that intend to approve alternative CT values for systems must describe in their primacy application what protocols they will require for site-specific studies.

## References for more detailed guidance

1. *LT2ESWTR Toolbox Guidance Manual*. USEPA, N.d.e. Forthcoming. ([www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2))

### 4.4.6 Establishment of Alternative Approach to UV Reactor Validation Testing

*§142.16 Special primacy requirements. (n): Requirements for states to adopt §141, subpart W. In addition to the general primacy requirements elsewhere in this part, including the requirements that state regulations be at least as stringent as federal requirements, an application for approval of a state program revision that adopts §141, subpart W, must contain a description of how the state will accomplish the following program requirements where allowed in state programs. 6) Approve an alternative approach to UV reactor validation testing in the microbial toolbox.*

#### Guidance

The LT2ESTWR requires that systems use UV reactors that have undergone validation testing to determine the operating conditions under which the required UV dose will be delivered [§141.720(d)(2)]. The operating conditions must include flow, UV intensity as measured by a UV sensor, and UV lamp status. The following specific factors, as described in §141.720(d)(2)(i), must be addressed when determining the operating conditions:

- \$ UV absorbance of the water.
- \$ Lamp fouling and aging.
- \$ Measurement uncertainty of on-line sensors.
- \$ UV dose distributions arising from the velocity profiles through the reactor.
- \$ Failure of UV lamps or other critical system components.
- \$ Inlet and outlet piping or channel configurations of the UV reactor.

The LT2ESTWR also allows states to approve an alternative approach to validation testing [§141.720(d)(2)(iii)]. States that intend to approve an alternative approach must describe in their primacy application how they will determine whether the alternative approach will assess reactor performance at least as well as the validation approach in the Rule. This flexibility was included to allow consideration of new technology developments that were not widely accepted at the time that this rule was written. Acceptance of an alternative approach should reflect EPA guidance and/or peer reviewed research and be consistent with generally accepted engineering practices for the treatment scenario under consideration.

For example, computational fluid dynamics (CFD) modeling has been used to estimate the UV dose distribution in specific reactor configurations. However, at the time that the LT2ESWTR was developed, CFD modeling was generally regarded by regulators as insufficient to replace full-scale reactor testing because uncertainty and error ranges for CFD models are not known. Also, synthetic microspheres may someday be useful as replacements for challenge microorganisms that could be used in full-scale validation testing.

States should note that UV reactors previously validated under certain existing protocols (i.e., prior to publication of this document) may receive log inactivation credit. The validation test must provide data on UV dose delivery and monitoring for a documented UV reactor and the proper analysis of those data must relate the measured performance to the required level of pathogen log inactivation credit. Acceptable protocols include the Austrian Standards ÖNORM M 5873-1 and M 5873-2, and the German Guideline DVGW W294. UV reactors certified by DVGW and ÖNORM for a *B. subtilis* RED of 40 mJ/cm<sup>2</sup> can be granted 3.0-log *Cryptosporidium* and 3.0-log *Giardia* inactivation credit (DVGW 1997, ÖNORM 2003).



However, validation under NWRI/AwwaRF Guidelines and NSF Standard 55 (NWRI/AwwaRF 2003, NSF 2002) may not meet the requirements of the Rule. States that use NWRI/AwwaRF Guidelines and NSF Standard 55 should describe how these validations would be evaluated to ensure that the requirements of the Rule are met.

*References for more detailed guidance*

1. *Ultraviolet Disinfection Guidance Manual*. USEPA, 2006. EPA 815-R-06-007.  
([www.epa.gov/safewater/disinfection/lt2](http://www.epa.gov/safewater/disinfection/lt2))

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## **Section 5**

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# **SDWIS Reporting and SNC Definitions**

**Note: This section is under development.**

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## **Section 6**

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# **Public Notification and Consumer Confidence Report Examples**

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This section provides examples of violations that systems may incur under the LT2ESWTR. These examples address the public notification and CCR requirements for systems that incur these kinds of violations. Public notification and notification in the CCR are required follow-up activities for violations of the NPDWR. Also included in the examples are sample public notices and sample excerpts from CCR reports that would meet these public notification and CCR requirements. In the public notification samples, the language in italics is required in Appendix B to Subpart Q of §141.211.

## *Issue 1: Failure to Take Action on Uncovered Finished Water Reservoir*

### System Description - System A

System A is a Subpart H system serving 12,000 people. The system has five finished water reservoirs, two of which are uncovered.

### Situation

On April 1, 2008, System A submits plans to the state detailing how and when it plans to cover its two uncovered finished water reservoirs. Systems are required to have a cover or treatment in place for all uncovered finished water reservoirs by April 1, 2009 or on a schedule approved by the state. However, System A does not cover its finished water reservoirs until January 27, 2010, returning to compliance with the LT2ESWTR one year after the schedule submitted to the state.

### Public Notification and CCR Requirements

System A has committed a TT violation as a result of the system's failure to have both of its uncovered finished water reservoirs covered by April 1, 2009. The system could have chosen to either cover the reservoir or treat the discharge from its uncovered finished water reservoirs to achieve inactivation and/or removal of 4.0-log virus, 3.0-log *Giardia lamblia*, and 2.0-log *Cryptosporidium* by the April 1, 2009 compliance date. System A also could have asked the state to approve an alternative schedule. However, since System A failed to implement any of the above options with regard to its finished water reservoirs before the April 1, 2009 deadline, the system is in violation of the LT2ESWTR. This is a TT violation and requires Tier 2 public notification. The system must provide public notification within 30 days of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that may not have received the information by mail or the direct delivery method used. For any unresolved violation following an initial Tier 2 notice, notice must be repeated every 3 months for as long as the violation persists. The system was aware of the violation on April 1, 2009. Repeat public notification would be required in this example until the violation is resolved on January 27, 2010.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-1.

All TT violations must also be included in the system's annual CCR. An explanation of how the system returned to compliance could also be included. An example of a report of this violation that could be used in the system's CCR is shown in Example 6-2.



### **Example 6-1. Example Tier 2 Public Notification for Failure to Take Action on Uncovered Finished Water Reservoir**

#### **IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER**

##### **System A Failed to Cover the Uncovered Finished Water Reservoirs by the Required Date**

Our water system recently violated a standard that requires all finished water reservoirs to be covered or the discharge from the reservoirs to be treated. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

We were required to cover or treat the discharge of all uncovered finished water reservoirs by April 1, 2009. Although we did not cover or treat the discharge of our uncovered finished water reservoirs by this date, we are developing plans to cover them. We expect to have them covered by the end of January 2010.

##### **What should I do?**

There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may be at increased risk and should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1 (800) 426-4791. If you have specific health concerns, consult your doctor.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

##### **What does this mean?**

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

An uncovered reservoir used to store treated water is susceptible to contamination from animals, such as birds or insects. Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

##### **What is being done?**

We have initiated the project to cover the uncovered finished water storage reservoirs. We expect to have the reservoirs covered by the end of January 2010. Until our finished water reservoirs are covered, you will receive a notice similar to this every 3 months.

For more information, please contact John Johnson, manager of System A, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System A.

State Water System ID# GA1234582. Sent: 4/15/2009

**Example 6-2. Example of a Notice in the CCR for Failure to Take Action on Uncovered Finished Water Reservoir**

<u><b>Water Quality Data</b></u>						
<b>Contaminant</b>	<b>MCL/ MRDL/ TT</b>	<b>MCLG</b>	<b>Value</b>	<b>Date</b>	<b>Violation</b>	<b>Source</b>
<i>Giardia lamblia</i> , Heterotrophic plate count bacteria, <i>Legionella</i> , <i>Cryptosporidium</i>	TT	0		April 2009	Yes*	Sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

\*System A incurred a treatment technique violation for failing to cover or treat the discharge from its uncovered finished water storage reservoirs by April 1, 2009. More information about this violation is provided in the violation section.

**Violation**

\$ We had begun the project but were unable to meet the deadline to cover our uncovered finished water storage reservoirs. All uncovered finished water storage reservoirs are required to be covered or the discharge treated by April 1, 2009. We did not have a state-approved schedule in place to extend the deadline. The system is planning to complete the project to install covers on the reservoirs in January 2010.

An uncovered reservoir used to store treated water is susceptible to contamination from animals, such as birds. Inadequately treated water or treated water that is contaminated may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

## *Issue 2: Failure to Notify the State before Making a Significant Change in Disinfection Practice*

### *System Description - System B*

System B is a large Subpart H system serving 109,000 people. It currently uses a conventional filtration treatment plant as defined in §141.2 and chlorinates its water at the entry to the presedimentation basin and after the filtration process. System B created a disinfection profile under §141.708.

### *Situation*

On January 1, 2010, System B modifies its disinfection process by eliminating the presedimentation basin chlorine application point and increasing the post-filtration chlorine dose. The PWS developed a disinfection profile that contains all the elements described in §141.708(a)(1) through (3), however, the system did not submit the plan to the state before making the change. System B submitted the plan to the state on March 1, 2010.

### *Public Notification and CCR Requirements*

Although System B appropriately prepared the necessary significant disinfection practice modification plan, it did not notify the state prior to changing disinfection practices. System B has committed a monitoring and reporting (M/R) violation as a result of the system's failure to notify the state prior to making a significant change to its treatment process. This M/R violation requires Tier 3 public notification, unless the state requires a higher tier notification. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System B is a CWS, it could use the CCR to inform the public of the Tier 3 violation if the CCR is released within 1 year of the system learning of the violations. For this particular example, the system became aware of the violation on February 1, 2010 and returned to compliance on March 1, 2010. The public could therefore be informed of the violation in the CCR produced for calendar year 2010 if the CCR is released prior to February 1, 2011 (the CCR for calendar year 2010 is required to be released by July 1, 2011, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, if public notification is provided by other means, this violation would still have to be reported by the system in the CCR produced for calendar year 2010, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-3. An example of a report of these violations in the CCR is shown in Example 6-4.

### **Example 6-3. Example Tier 3 Public Notification for Failure to Receive Approval Before Making a Significant Change in Disinfection Practice**

#### **IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER**

##### **System B Failed to Receive Approval Before Making a Significant Change to our Disinfection Practice**

Our water system recently failed to notify the state prior to significantly modifying our disinfection practices. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

On January 1, 2010, we made some changes at the water treatment plant to reduce disinfection byproducts in the distribution system. We stopped chlorinating at the presedimentation basin and increased the amount of chlorine we add after the water is filtered. This is considered a significant change to our disinfection practice and we were required to notify the state before making the change. We prepared a plan with specific information on proposed changes to our disinfection practices, including a description of the proposed change, specific disinfection records, and an analysis of how the proposed change would affect the levels of disinfection in our system. However, we did not submit a copy of the report to the state before making any changes to our disinfection practices.

#### **What should I do?**

There is nothing you need to do. Although this change modified our treatment process, our facility continues to provide more than the minimum required inactivation treatment for disease-causing organisms.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

#### **What does this mean?**

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

This change to our disinfection practices without notifying the state did not adversely impact our water quality and we have met all treatment requirements. Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. However, we are not aware of any health effects on you, our customer, as a result of this modification.

#### **What is being done?**

We submitted our plans to the state on March 1, 2010. The state approved the changes to disinfection process on April 1, 2010.

For more information, please contact John Johnson, manager of System B, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System B.

State Water System ID# GA1234582. Sent: April 10, 2010

**Example 6-4. Example of a Notice in the CCR for Failure to Notify the State before Making a Significant Change in Disinfection Practice**

**Violation**

\$ On January 1, 2010 we stopped adding chlorine to the early stages of our treatment process and increased the amount of chlorine we add before the water is distributed to consumers. We prepared a plan with specific information on the proposed changes, including a description of the proposed changes, specific disinfection records, and an analysis of how the proposed change would affect the levels of disinfection in our system. However we did not submit a copy of the report to the state before making the changes.

A change to our disinfection practices without state approval did not adversely impact our water quality and we continue to meet all treatment requirements. Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches. However, we are not aware of any health effects that occurred as a result of this modification.

We submitted our plans on March 1, 2010. The state approved the changes to disinfection process on April 1, 2010. This violation is now resolved.

### *Issue 3: Failure to Provide the Level of Treatment Appropriate for Bin Classification*

#### System Description - System C

System C is a small Subpart H system using surface water and serving 7,500 people. It currently uses a conventional filtration treatment plant as defined in §141.2 and uses chlorine as its primary disinfectant.

#### Situation

System C, which monitors for *Cryptosporidium*, meets its source water monitoring requirements since it begins 24 months of monthly source water monitoring by April 1, 2010. System C finishes this monthly monitoring for its initial round of source water monitoring by April 1, 2012. The system determines that its *Cryptosporidium* bin concentration is 0.9 oocysts/L, which classifies it as Bin 2. System C therefore needs to provide an additional 1.0-log of *Cryptosporidium* treatment by October 1, 2014 or be in compliance with a state-approved alternative schedule. System C chooses to install UV disinfection to achieve the necessary treatment credits. Since UV will meet *Giardia* and *Cryptosporidium* requirements, System C may be able to decrease the amount of chlorine currently used. The system is required to submit its plans to the state for approval. After receiving approval of its plan from the state, System C proceeds to install and operate its additional treatment. On April 1, 2015, System C installs and begins operating UV disinfection applied as the last step of treatment.

#### Public Notification and CCR Requirements

System C has committed a TT violation. The required treatment was not installed and operational prior to the compliance date of October 1, 2014. Treatment should have been installed by October 1, 2014. The system could have been granted a 2 year extension, but in this example it was not. This is a TT violation and requires Tier 2 public notification. The system must provide public notification within 30 days of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. For any unresolved violation following an initial Tier 2 notice, notice must be repeated every 3 months for as long as the violation persists. System C became aware of the violation on November 2, 2014. Repeat public notification is required in this instance since the violation was not resolved until April, 1 2015.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-5.

All TT violations must also be included in the system's annual CCR. An explanation of how the system returned to compliance could also be included. An example of a report of this violation that could be used in the system's CCR is shown in Example 6-6.

### **Example 6-5. Example Tier 2 Public Notification for Failure to Provide the Level of Treatment Appropriate for Bin Classification**

#### **IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER**

##### **System C Failed to Provide the Appropriate Level of Treatment Within the Required Time Frame**

Our water system failed to install our new UV disinfection system by the required treatment date of October 1, 2014. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

We are required to install and have additional treatment operating to provide additional *Cryptosporidium* inactivation or removal by October 1, 2014. We anticipate the system will be operational in April, 2015.

#### **What should I do?**

There is nothing you need to do unless you have a severely compromised immune system, have an infant, or are elderly. These people may be at increased risk and should seek advice about drinking water from their health care providers. General guidelines on ways to lessen the risk of infection by microbes are available from EPA's Safe Drinking Water Hotline at 1 (800) 426-4791. If you have specific health concerns, consult your doctor.

You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

#### **What does this mean?**

This is not an emergency. If it had been, you would have been notified within 24 hours.

Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

#### **What is being done?**

We are currently under construction for the project and we expect to have the additional treatment operating by April, 2015.

For more information, please contact John Johnson, manager of System C, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System C.

State Water System ID# GA1234582. Sent: November 20, 2014

**Example 6-6. Example of a Notice in the CCR for Failure to Provide the Level of Treatment Appropriate for Bin Classification**

<u><b>Water Quality Data</b></u>						
<b>Contaminant</b>	<b>MCL/ MRDL/ TT</b>	<b>MCLG</b>	<b>Value</b>	<b>Date</b>	<b>Violation</b>	<b>Source</b>
<i>Cryptosporidium</i>	TT	0		October 2014	Yes*	

\*System C incurred a treatment technique violation for failing to provide the level of treatment appropriate for our system's treatment classification. More information about this violation is provided in the violation section.

**Violation**

\$ Our water system failed to provide the level of treatment appropriate for our system's treatment classification. We were required to install and have additional treatment operating to provide additional *Cryptosporidium* removal by October 1, 2014. The system became operational in April, 2015. You were notified of this violation in November, 2014 and again in February, 2015.

\$ Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.



#### *Issue 4: Failure to Conduct Source Water Monitoring (Initial or Second Round)*

##### System Description - System D

System D is a small Subpart H system serving 3,000 people that uses a small lake as a source. Small systems that provide filtration or are required to provide filtration must initially conduct 1 year of bi-weekly sampling (one sample every 2 weeks) for *E. coli*, beginning October 1, 2008. These systems are triggered into *Cryptosporidium* monitoring only if the initial *E. coli* monitoring indicates a mean concentration greater than 10 *E. coli*/100 mL for systems using a reservoir or lake as their primary source. The small systems that exceed these *E. coli* trigger values must either monitor for *Cryptosporidium* twice-per-month for 1 year, or at least monthly for 2 years beginning April 1, 2010.

##### Situation

System D begins conducting *E. coli* monitoring on October 1, 2008. After 1 year of monitoring, System D determines that its annual mean *E. coli* concentration is 31 *E. coli*/100 mL. System E does not conduct any further source water monitoring and does not intend to install TTs to achieve 5.5-log of treatment for *Cryptosporidium*.

##### Public Notification and CCR Requirements

System D has committed an M/R violation during the first 3 months for failure to collect three or more *Cryptosporidium* samples and report the results to EPA or the state. Based on the annual mean concentration of *E. coli* determined by the initial source water monitoring (31 *E. coli*/100 mL is greater than 10 *E. coli*/100 mL), System D is required to begin source water monitoring for *Cryptosporidium* at least monthly for 2 years no later than April 1, 2010. Failing to take three or more samples is an M/R violation that required special notice at the same level as Tier 2 public notice within 30 days of learning of the violation. The system became aware of the violation on July 12, 2010. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered. Repeat notices must be provided every 3 months as long as the violation exists.

An example of a public notice that fulfills the public notification requirements is shown in Example 6-7. An example of a report of this violation in the CCR is shown in Example 6-8.

### **Example 6-7. Example Tier 2 Public Notification for Failure to Conduct Source Water Monitoring (Initial or Second Round) and Report the Results**

#### **IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER Monitoring and Reporting Requirements Not Met for System D**

We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at Plant A is sufficient to adequately treat the water for *Cryptosporidium*. We are required to complete this monitoring and make this determination by April 1, 2012. We did not monitor or test on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, October 1, 2014.

#### **What should I do?**

There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

#### **What was done?**

On August 2, 2010, we will begin collecting the required source water monitoring samples.

For more information, please contact John Johnson, manager of System D, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System D.

State Water System ID# GA1234589. Sent: July 20, 2010

**Example 6-8. Example of a Notice in the CCR for Failure to Conduct Source Water Monitoring (Initial or Second Round) and Report the Results**

**Violation**

- \$ Our water system recently failed to conduct additional source water monitoring as required. We were required to begin source water monitoring for *Cryptosporidium* at least once each month for 2 years no later than April 1, 2010. On August 2, 2010 we began collecting the required source water monitoring samples.
- \$ Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

*Issue 5: Failure to Submit a Source Water Monitoring Schedule 3 Months Prior to Date System is Required to Begin Monitoring*

*System Description - System E*

System E is an unfiltered Subpart H system serving 2,500 people that meets all the criteria for avoiding filtration found in §141.71.

*Situation*

System E submits a sampling schedule to the state for the initial round of source water monitoring January 1, 2010, however, it forgets about the second round of source water monitoring that is required and does not submit a sampling schedule. On March 1, 2019, 1 month before System E is required to begin the second round of source water monitoring, a neighboring water system reminds System E that it is required to conduct a second round of source water monitoring. System E develops a sampling schedule and fulfills its source water M/R requirements in accordance with the schedule in §141.701(c).

*Public Notification and CCR Requirements*

System E has committed an M/R violation for failing to submit a sampling schedule to the state for the second round of source water monitoring before January 1, 2019 (i.e., 3 months before the second round of source water monitoring), even if it conducts the required monitoring and reported the results to the state. This is an M/R violation and the system must provide Tier 3 public notice of the violation. The system must provide public notification within 1 year of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System E is a CWS, it could use the CCR to inform the public of the Tier 3 violations if the CCR is released within 1 year of the system's learning of the violations. For this particular example, the system became aware of the M/R violation on March 1, 2019. The public could therefore be informed of the violation in the CCR produced for calendar year 2019 if the CCR is released prior to March 1, 2020 (the CCR for calendar year 2019 is required to be released by July 1, 2020, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, whether public notification is provided by other means, the violation would still have to be reported by the system in the CCR produced for calendar year 2019, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-9. An example of a report of this violation in the CCR is shown in Example 6-10.

**Example 6-9. Example Tier 3 Public Notification for Failure to Submit a Source Water Monitoring Schedule 3 Months Prior to Date System is Required to Begin Monitoring**

**IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER**  
**Monitoring and Reporting Requirements Not Met for System E**

Our water system recently failed to submit a source water monitoring schedule 3 months before the date we were required to begin the monitoring. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct the situation.

**What should I do?**

There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

**What was done?**

On March 10, 2019, 1 month before we were required to begin the source water monitoring, we developed a monitoring schedule and fulfilled our source water monitoring and reporting requirements as required.

For more information, please contact John Johnson, manager of System E, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System E.

State Water System ID# GA1234589. Sent: March 20, 2019

**Example 6-10. Example of a Notice in the CCR for Failure to Submit a Source Water Monitoring Schedule 3 Months Prior to Date System is Required to Begin Monitoring**

**Violation**

- \$ We failed to submit a source water monitoring schedule 3 months before the date we were required to begin the source water monitoring.
- \$ On March 10, 2019, 1 month before we were required to begin the source water monitoring, we developed a sampling schedule and fulfilled our source water monitoring and reporting requirements as required.

## *Issue 6: Failure to Collect Samples in Accordance with Sampling Schedule*

### *System Description - System F*

System F is a small filtered Subpart H system serving 9,000 people.

### *Situation*

System F has two qualified operators. While System F is conducting its required source water monitoring for *E. coli*, the operator that usually collects the bi-weekly *E. coli* sample goes on vacation for 1 month. System F's other operator decides to wait until his/her colleague returns to work to continue the required source water monitoring instead of collecting the samples themselves. Therefore, System F does not collect samples for the month of December 2008.

### *Public Notification and CCR Requirements*

System F has committed an M/R violation for failing to sample within 2 days before, or 2 days after the scheduled date. The LT2ESWTR allows systems that face "extreme conditions," situations "that may pose danger to the sampler," "unforeseen" situations, or situations that "cannot be avoided" to sample as close to the scheduled date as is feasible and to submit an explanation for the alternative sampling date with the analytical results. A vacationing operator does not satisfy any of these scenarios. Since the system failed to collect the sample, this is an M/R violation and the system must provide Tier 3 public notice of the violation. The system must contact the state to revise their sampling schedule by adding dates for missed samples. Notification must be provided by mail or other direct delivery method (such as hand delivery) and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System F is a CWS, it could use the CCR to inform the public of the Tier 3 violation if the CCR is released within 1 year of the system's learning of the violations. For this particular example, the system became aware of the M/R violation on January 1, 2009. The public could therefore be informed of the violation in the CCR produced for calendar year 2009 if the CCR is released prior to January 1, 2010 (the CCR for calendar year 2009 is required to be released by July 1, 2010, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, whether public notification is provided by other means, the violation would still have to be reported by the system in the CCR produced for calendar year 2009, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-11. An example of a report of this violation in the CCR is shown in Example 6-12.

### **Example 6-11. Example Tier 3 Public Notification for Failure to Collect Samples in Accordance with Sampling Schedule**

#### **IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER Monitoring and Reporting Requirements Not Met for System F**

Our system is required to collect one year of bi-weekly source water samples. In the month of December 2008, we failed to collect the source water samples. We are required to collect these samples to determine if additional treatment of our source water is necessary. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

#### **What should I do?**

There is nothing you need to do. You do not need to boil your water or take other corrective actions. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

#### **What was done?**

On January 10, 2009, we submitted a request to the state to sample our source water next December so that we will have representative samples from each month. The state approved our request for this change on January 24, 2009. This adjusted schedule will not affect our ability to determine if more treatment is needed, or to install such treatment within the required time frame, if it is necessary.

For more information, please contact John Johnson, manager of System F, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System F.

State Water System ID# GA1234589. Sent: January 26, 2009



**Example 6-12. Example of a Notice in the CCR for Failure to Collect Samples in Accordance with Sampling Schedule**

**Violation**

- \$ We failed to collect two source water samples in December 2008 in accordance with our sampling schedule. Our system is required to collect bi-weekly source water samples.
- \$ In January 2009, we negotiated with the state a schedule for sampling in December 2009. These samples were collected as required and no additional treatment needs are necessary for our system.

## *Issue 7: Failure to Sample at an Appropriate Location*

### System Description - System G

System G is a large Subpart H system serving 15,000 people. System G uses bank filtration to meet the source water filtration requirement of §141.173(b). The water body adjacent to the collector well is a large river.

### Situation

On April 1, 2008, System G begins to conduct monthly monitoring for *Cryptosporidium*. System G collects its first two samples from the well, after bank filtration. The system source water monitoring plan indicated it would collect samples from the river. The state identifies the sample location error and directs the system to begin sampling from the adjacent river, beginning June 1, 2008. The state further directs the system to collect source water samples for April and May of 2010 (at the end of the 2-year monitoring period) to ensure representative samples are obtained for each calendar month for 2 years.

### Public Notification and CCR Requirements

System G has committed an M/R violation. Systems using bank filtration as an alternative filtration to meet the *Giardia lamblia* and virus inactivation and *Cryptosporidium* removal requirements of §141.173(b) or 141.552(a) must take surface water samples prior to bank filtration. Only unfiltered GWUDI systems meeting the filtration avoidance criteria in §141.71 and bank filtered systems that receive no treatment credit for bank filtration can collect samples from the well (after bank filtration). This is an M/R violation and the system must provide Tier 3 public notice of the violation. The system must provide notification within 1 year of learning of the violation. Notification must be provided by mail or other direct delivery method (such as hand delivery), and any other reasonable method to reach affected individuals that would not have received the information by mail or the direct delivery method used. Notice must be provided to each customer receiving a bill and other service connections to which water is delivered.

Since System G is a CWS, it could use the CCR to inform the public of the Tier 3 violations if the CCR is released within 1 year of the system's learning of the violation. For this particular example, the system became aware of the violation on May 10, 2008. The public could therefore be informed of the violation in the CCR produced for calendar year 2008 if the CCR is released prior to May 10, 2009 (the CCR for calendar year 2008 is required to be released by July 1, 2009, for compliance with the CCR Rule). In this situation, additional public notification would not be required. However, whether public notification is provided by other means, this violation would still have to be reported by the system in the CCR produced for calendar year 2008, since all violations of National Primary Drinking Water Rules must be reported in the CCR for the calendar year in which the system became aware of the violation. The violation report in the CCR should include similar information contained in the public notice.

An example of a public notice that fulfills the public notification requirements for this violation is shown in Example 6-13. An example of a report of this violation in the CCR is shown in Example 6-14.

### Example 6-13. Example Tier 3 Public Notification for Failure to Sample at an Appropriate Location

#### IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER System G Did Not Collect Source Water Samples at the Correct Location

Our system is required to collect source water samples once each month for two years. These samples are to be collected prior to any treatment and will be used to determine if additional treatment is necessary. On April 1, 2008, we began to conduct the required monitoring for *Cryptosporidium*. However, the first two samples were collected at the wrong location. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we did to correct this situation.

##### **What should I do?**

There is nothing you need to do. You do not need to boil your water or take other corrective actions. This monitoring violation did not affect our water treatment system and was only intended to indicate the quality of our source water before any treatment is applied. You may continue to drink the water. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours. We will announce any emergencies on Channel 22 or Radio Station KMMM (97.3 FM).

##### **What was done?**

On May 10, 2008, we determined the samples were collected at the wrong location. The sampling location has been corrected and the samples will now be collected at the appropriate location. This situation is now resolved.

For more information, please contact John Johnson, manager of System G, at 555-1234 or write to 2600 Winding Rd., Townsville, GA 12345.

*Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.*

This notice is being sent to you by System G.

State Water System ID# GA1234589. Sent: May 15, 2008

**Example 6-14. Example of a Notice in the CCR for Failure to Sample at an Appropriate Location**

**Violation**

- \$ We failed to collect the first two source water monitoring samples at the appropriate location. Our system uses bank filtration to meet the *Giardia lamblia* and virus inactivation and *Cryptosporidium* removal requirements and must take surface water samples. On April 1, 2008, we began to conduct monitoring for *Cryptosporidium*, however, the first two samples collected were collected at the wrong location in the system.
- \$ On May 10, 2008, we determined the samples were collected at the wrong location. The sampling location has been corrected and the samples will now be collected at the appropriate location. The situation is now resolved. This issue had no affect on the treatment system or the quality of the water we provide.